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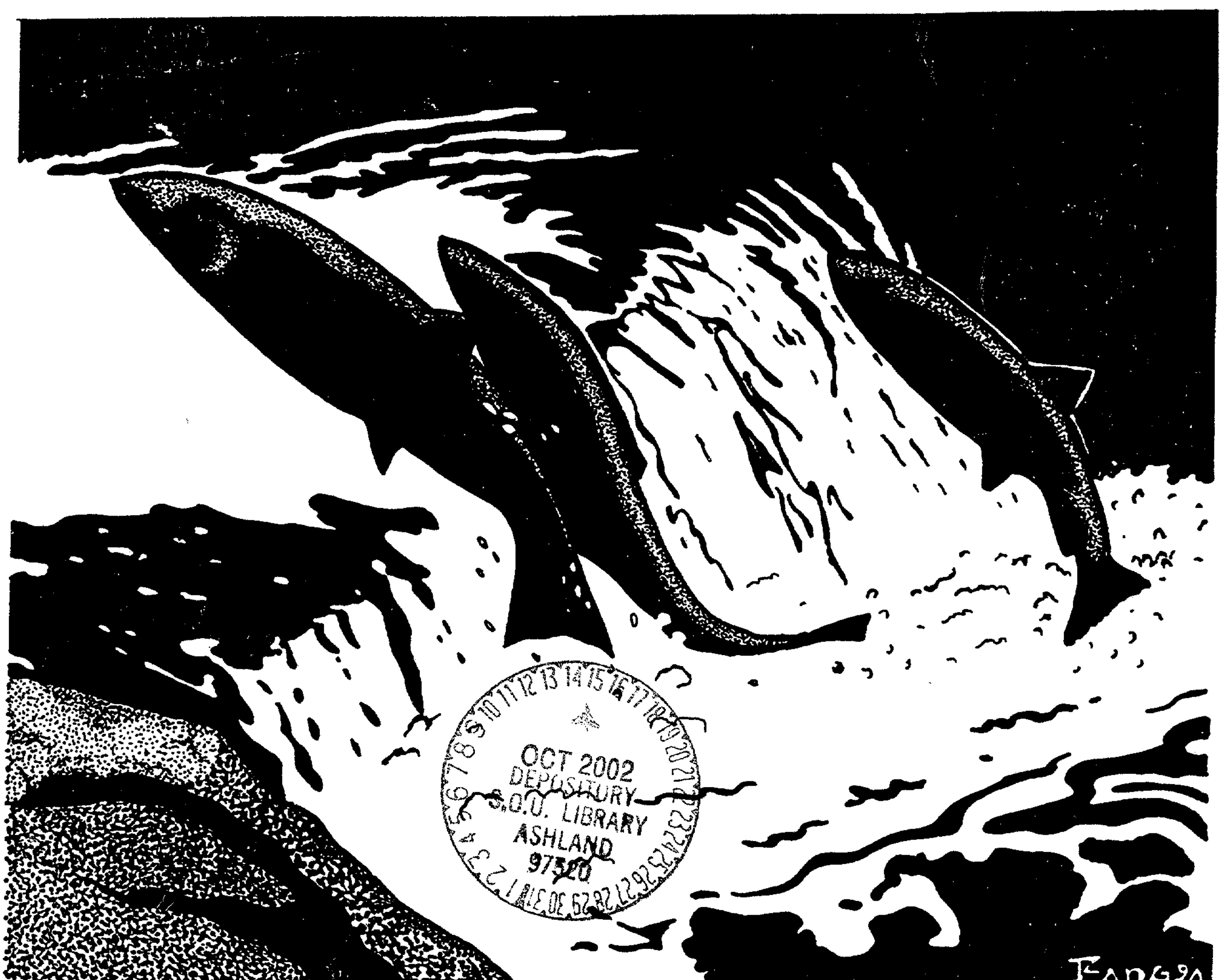
LOBSTER CREEK WATERSHED ANALYSIS ITERATION 2.0



I have read this analysis and find it meets the Standards and Guidelines for watershed analysis required by The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April, 1994).

SIGNED Michael Frazer

District Ranger
Gold Beach Ranger District
Siskiyou National Forest

DATE 4/12/99

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INTRODUCTION

The Lobster Creek Watershed Analysis, Iteration 2.0, was initiated to update the information in Iteration 1.0 and more thoroughly analyze the aquatic, terrestrial, and social resources of the watershed. The watershed analysis was completed by an interdisciplinary team using the six step process outlined in *Ecosystem Analysis at the Watershed Scale (Version 2.2, August 1995).* The analysis includes the entire watershed, but focuses more detail on National Forest land. This document has the following components: the aquatic ecosystem, the terrestrial ecosystem, and social aspects.

The information gathered and analyzed will be used to guide future resource management, and ensure that Aquatic Conservation Strategy objectives and other Standards and Guidelines contained in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994) will be met on Federal lands.

The Lobster Creek Whole-Basin Restoration Partnership was formed in 1994 with the goal of developing a whole basin restoration strategy for Lobster Creek. It is coordinated by Watershed Initiatives in Eugene, Oregon. The partners are Curry Soil and Water Conservation District, Hancock Timber Resource Group, Lower Rogue Watershed Council, Oregon Department of Fish and Wildlife, Pacific Rivers Council, and the Siskiyou National Forest. The partnership contributed data, analysis, and impetus for the completion of the watershed analysis.

Lobster Creek Watershed

The Lobster Creek watershed is located in the Klamath Mountains Province in southwestern Oregon (see Vicinity Map). Lobster Creek drains into the Rogue River approximately ten miles from the Pacific Ocean. The watershed has 44,253 acres, 60 percent of which is on the Gold Beach Ranger District of the Siskiyou National Forest. The remaining 40 percent is divided among the Bureau of Land Management, the State of Oregon, Curry County, private timber companies, and other private landowners (see Table 1 and Land Ownership Map).

Table 1. Land Ownership

Ownership	Acres	Percent
USDA Forest Service	26,862	61
USDI Bureau of Land Management	1,402	3
State of Oregon	640	1
Curry County	52	
Private	15,297	35
Total	**44,253**	

Direction for management of the National Forest System land is provided by the Siskiyou Land and Resource Management Plan (LRMP, USDA, 1989,) as amended by the Record of Decision and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related species Within the Range of the Northern Spotted Owl (ROD, USDA and USDI, 1994). Management areas for the National Forest System lands within the Lobster Creek watershed are listed in Table 2 and on the Management Areas Map. The definitions and management strategy for these areas can be found in the ROD and in the LRMP.

Table 2. Management Areas

Management Area	Acres	Percent
Botanical	431	2
Unique Interest	135	0.5
Supplemental Resource	1,303	5
Late Successional Reserves	17,846	66
Special Wildlife Sites	124	0.5
Riparian Reserves *	1,261	5
Matrix	5,758	21
Total	**26,858**	

*Riparian Reserve acres have been calculated for all mapped perennial and intermittent streams. Small intermittent streams have not been mapped.

KEY FINDINGS

The Lobster Creek Watershed has fewer and smaller **landslides** than neighboring watersheds such as Quosatana Creek and Lawson Creek. The greatest landslide disturbances since 1940 occurred during the decade from 1955 to 1965, probably as a result of the 1955 and 1964 floods.

Landslides related to **timber harvest and road construction** exposed approximately one third as many acres as those with natural causes on the 1969 aerial photos. Landslide acres related to timber harvest and road construction were approximately equal to those with natural causes on the 1986 photos.

The **flood event** of November, 1996, which is estimated as a 10 to 25 year event in this watershed, had little effect on landslides, sediment delivery to streams, or fish habitat in the Lobster Watershed.

Stream temperatures in the mainstem of Lobster Creek and the lower North and South Forks are warmer than the state standard for anadromous fish, as is characteristic of streams of this size in the western Siskiyou National Forest. The greatest heating occurs in the lower four miles of the South Fork.

Lobster Creek is the most important **fish producing stream** unit in the lower Rogue River (mouth of Rogue to river mile 43, near Stair Creek). Fish using Lobster Creek as habitat for some part of their life cycle include coho and chinook salmon, steelhead, rainbow, and cutthroat trout, Pacific lamprey, sculpin, and redside shiners.

The amount of **large wood** in Lobster Creek is low, and the supply of future large wood to the mainstem and the lower North Fork has been depleted by timber harvest.

Three **critical fish production reaches** were identified as "source areas" by the Lobster Creek Whole-Basin Restoration Partnership. Watershed restoration projects in the basin are prioritized to protect and improve fish habitat in these source areas.

The amount of **late-successional forest** in the watershed has declined from 34,960 acres in the 1940s to 11,063 acres presently. The amount of **interior late-successional forest** has declined from 11,153 acres in 1940 to 2,544 acres currently.

The watershed provides important habitat for **late-successional habitat dependent species**. It is home to six pairs of northern spotted owls, a relatively high density for spotted owls. Marbled murrelets are known to occupy 2,898 acres in the watershed. This is a high percentage of the known marbled murrelet occupied stands on the Gold Beach Ranger District.

Development of late-successional structure can be accelerated through treatment of managed and natural stands in late-successional reserves, riparian reserves, and other allocations not programmed for timber harvest. The highest priority for treatment to improve **late-successional habitat** are those stands that are in late-successional blocks and those where vegetation density is reducing growth rates.

Natural **meadows** are smaller now than they were in 1940 due to the increasing number and size of trees now growing in the meadows. This likely the result of fire suppression in the watershed. The pioneer habitat (meadows and young trees) is concentrated on the lower portions of the Lobster Watershed in private ownership. Elk populations, which utilize this habitat type, are also concentrated in this area.

Gorse, Scotch broom and French broom (**noxious weeds**) have invaded the watershed and the numbers of populations are increasing. Their aggressive nature threatens to destroy native plant communities. High concentrations of weeds in neighboring areas, particularly Elk River, is one of the reasons why there is such a high number of gorse and broom sites in this watershed.

Port-Orford-cedar is an integral part of the ecosystem, and is widely distributed throughout the watershed. ***Phytophthora lateralis*** is evident in almost every tributary in the eastern third of the National Forest portion of the watershed. The disease has been observed on privately-owned land, but its location and extent have not been recorded.

The primary **recreation opportunities** in the watershed are road-related, including recreational driving, hunting, and dispersed camping. The Lake of the Woods Lookout will be available as a recreational rental in the summer of 1999. The rent collected will be used to maintain the facility.

Due to the watershed's proximity to the ocean, the area receives a marine air influence, primarily in the western two-thirds of the watershed. This prevents large scale **fires** from developing. During the past 80 to 90 years human causes accounted for the vast majority of both the number of fires and the acres burned.

Roads within the Lobster Creek Watershed were inventoried on both National Forest and John Hancock land in 1998. Four of the smaller Watershed Analysis Areas were identified as the highest priority for repair of stream crossings or fills. Most of the identified road problem sites within two of these WAAs were repaired by Hancock Timber Resources Group shortly after the inventory was completed.

AQUATIC ECOSYSTEM NARRATIVE

Geologic Characterization

The Lobster Creek watershed is part of the Klamath Mountains geologic province and includes a mixture of igneous, metamorphic, and sedimentary formations. Ground slopes are low to moderate, averaging 30 to 50 percent in the southern half of the watershed and 40 to 70 percent in the northern half (see Slope Classes Map). Elevations range from approximately 40 feet near the confluence with the Rogue River to over 3800 feet near Iron Mountain.

Lithology

Rocks within the watershed are typical of those found in the northwestern portion of the Klamath Province. The majority of the rocks are Jurassic aged marine sediments (135-165 million years old) or the metamorphic products of those sediments. Cretaceous aged sediments (100-135 million years old) are found in the north and west portions of the watershed. Igneous rocks include Cretaceous aged intrusives found in the upper part of the watershed (see Geology Map).

The Colebrooke and Galice formations cover approximately 86 percent of the watershed. The Colebrooke formation is 41 percent and the Galice formation is 45 percent. The most abundant rock type in the lower portion of the watershed is Colebrooke schist, which forms the bedrock on the majority of private lands.

The type-section for the Colebrooke formation is found four miles west of the watershed boundary in the north east quarter of section 33, T.34S., R.14W., at Colebrooke Butte. Ramp (1977) describes Colebrooke schist as the product of tectonic metamorphism of fine-grained sedimentary rocks and subordinate submarine basalts, which were originally Galice formation rocks. The predominant rock type is a silver-gray, fine-grained schist or phyllite with abundant quartz veins. The metavolcanic rocks of the Colebrooke formation are likely derivatives of volcanic rocks of both the Galice and Rogue formations.

Slope mapping indicates that the south half of the watershed, which is composed primarily of Colebrooke metasediments, has flatter slopes, ranging from 30 to 50 percent. An exception to these flatter slopes is Coffee Butte, which is composed of Colebrooke metavolcanics. These metavolcanics are more resistant to erosion, but are also more prone to ravel.

The fractured nature of the Colebrooke formation appears to create high permeability and porosity. These properties, as well as greater soil depth due to weathering, allow the rock to store and transport large amounts of water, which may result in Colebrooke rocks having higher moisture levels during dry periods. This may contribute to Colebrooke-derived soils being a more biologically productive site relative to other rock types.

The ability to store water may also account in part for the downstream cooling in Lobster Creek in the summer. Cool water stored in the Colebrooke formation is released from springs, entering the stream system and maintaining cool temperatures. (See water quality section).

Large portions of National Forest lands are of the Galice formation. Galice formation rocks are fine to medium grained sediments that have undergone some low-grade metamorphism, making them relatively hard and resistant to erosion. This property creates areas that are higher topographically than areas covered by other rock units, and forming steeper slopes than those seen in the Colebrooke formation. The Galice formation does not appear to have the high level of fracturing seen in the Colebrooke, and is also more resistant where coarser-grained sandstones are well-cemented, both of which contribute to decreasing water storage abilities and resulting in a relatively drier site than the Colebrooke formation.

Commonly the Galice formation will form areas of ravel when disturbed, although slump earthflows can also be seen within the Galice rocks. Frequently, those slump earthflows are found along faults and their associated shear zones. Some of these landslides are very large, covering many acres, but these large slides have not been active for hundreds or thousands of years.

The "old-growth core" referred to in the wildlife section is growing on the Galice metasediments.

Gabbros are igneous rocks that typically form topographic highs due to their erosion resistance. Within the watershed gabbros form topographic highs in the area of Panther mountain and at Toast Camp. Gabbros also form a steep canyon along Boulder Creek, with slopes in excess of 80 percent. The gabbros have limited groundwater storage capacity. Although rainfall is high, more pines grow in these areas, providing habitat diversity that attracts bird species such as Townsend's solitaire.

Diorite, another igneous rock, has intruded the Galice Formation in several areas. Its high erosion resistance forms a topographic high in the headwaters of Lobster Creek in the area of McCurdy Camp. The diorite is small in area, but is notable since it is suspected of being the source of gold mineralization found in the Bonanza Basin area.

Also found within the watershed are some ultramafic rocks, which total approximately 1,673 acres. These rocks include peridotite, serpentine and other undifferentiated ultramafic rocks. The three rock types are listed as one unit on the Geology Map. The rocks of this group are found mainly in and around the gabbros of Boulder Creek.

Cretaceous sediments cover an area of approximately 1,151 acres in the northwest of the basin near Lost Valley. For the most part these sediments appear to be similar in characteristics to Galice formation rocks. They commonly form areas of ravel when disturbed and appear to be similar in site productivity characteristics.

Table 3. Geologic Rock Types

Formation or Rock Type	Acres	Percent
Colebrooke Schist metasediments	18,045	41
Colebrooke metavolcanic rocks	386	1
Diorite	170	
Gabbro	2,754	6
Galice Formation Undifferentiated	20,007	45
Cretaceous Sediments	1,151	3
Ultramafic rocks undifferentiated	1,673	4
Quaternary alluvium	37	
Dothan Formation	29	

Structure

Numerous high angle (greater than 30 degrees) faults cut through the watershed in a north-northwest direction. They can be identified in aerial photographs and appear to have predominantly vertical displacement. The largest fault in the watershed is the Mountain Wells Fault which has a total estimated length of over 30 miles. Shear zones of varying widths are found along faults, resulting in a preferred orientation of some streams along faults. The Mountain Wells Fault appears to influence the orientation of the main stem of Lobster Creek.

Thrust or low angle (less than 30 degrees) faults are found along the contact between gabbros and Galice formation rocks in the vicinity of Boulder Creek. The thrust fault indicates a zone of detachment where older gabbros were thrust over and on top of younger Galice rocks.

Several prominent high angle faults can be seen in the area of Boulder Creek. These faults have an obvious vertical displacement and create offsets and low ridgetop areas.

Faults separate most of the rock formations from one another with few if any conformable contacts between formations. These areas have a higher probability of landslide formation. Areas of fault contact also coincide with many of the gradient changes observed along streams within the watershed, due to differences in erosion rates between rock units.

Geomorphology

Orientation of features: Many of the ridges are formed by erosion-resistant rocks, for example the Pearse peak diorite. A notable feature of the watershed is the orientation of the North Fork Lobster, Boulder Creek, and a tributary of the South Fork. All have a southwest orientation which terminates abruptly at their individual confluences with the main stem of the South Fork. The South Fork extends almost all the way across the watershed in a west-northwest direction seeming to truncate the other three streams. From there the mainstem of the South Fork traverses to the western edge of the watershed where Lobster Creek resumes the south by southwest orientation. About five miles upstream of the confluence with the Rogue River, the mainstem of Lobster Creek migrates to a more typical orientation near the middle of the watershed. A plausible reason for this occurrence is a fault cutting across the watershed in a west by northwest orientation. At this time no large fault of such an orientation has been mapped but it may be observed on a more regional scale.

Stream gradients can be influenced by the faults discussed above (see Stream Gradient Classes Map, and Stream Profiles). Gradients can also be influenced by landslides, as in the case of Boulder Creek at Bonanza Basin. The depositional, low gradient stream segment located in the steep headwaters of the watershed appears anomalous. The apparent cause is an ancient landslide deposit of approximately 300,000 cubic yards which blocked Boulder Creek, reducing gradients above the slide and creating an area of deposition. Depths of the deposited gravels are unknown, but accounts of miners in the early 1900s indicate that the depth to bedrock is greater than 14 feet (map is in process records).

What are the dominant erosion processes in the watershed?

Erosion processes in the watershed are primarily landslides. Surface erosion occurs on exposed surfaces such as roads, but the volume of material generated is a minor component compared to the material generated from landslides. The Lobster Creek Watershed has fewer and smaller landslides than neighboring watersheds such as Quosatana Creek and Lawson Creek. It does not have the extensive inner gorge landslides that deliver large volumes of sediment to the mainstem and forks, although there are several inner gorge slides in the lower South Fork.

Landslides were reviewed on aerial photos taken in 1940, 1969, and 1986. Estimates were made of the surface area of landslides active at the time of the photos. Those estimates are summarized in Table 4. It should be emphasized that these figures are visual estimates made from aerial photographs, not field measurements. They do not take into account photographic distortion, elevation, or other factors that could increase or decrease the apparent area of landslides. A qualitative review of the 1997 aerial photos, taken after the flood event of November 1996 found little apparent change in landslide area from the 1986 photos.

Based on a report done by the Oregon Department of Forestry (ODF) (1998) it is expected that landslide acres attributed to natural causes are underestimated. That report identified landslides from aerial photographs and in the field and found that aerial photographic identification of landslides underestimated the number and volume of landslides. The report states that 75 percent of landslides identified using ground based surveys were not found in the aerial photographs. Those landslides accounted for 55 percent and 42 percent of the total volume of landslide material at two of the study sites. The primary cause of non-identification in aerial photos was attributed to dense canopy cover in areas of mature forest. The ODF study examined slopes where the primary landslide type was debris flows, which are narrow and difficult to detect. Although the landslides in Lobster Creek are primarily broader features, acreage could be hidden under the canopy. Since a ground based survey has not been done here, an exact estimate of acreage of landslides of natural origin is not known.

Table 4. Acres of Landslides per Thousand Acres of Subwatershed

Year	Subwatershed	Acres in Subwatershed	Natural Landslide Acres per Thousand	Harvest Related Landslide Ac/Thous	Road Related Landslide Ac/Thous	Total Landslide Acres per Thousand
1940	20L-Mainstem	18,219	0.57			0.57
	20S-South Fork	16,130	2.13			2.13
	20N-North Fork	9,904	4.90			4.90
	Total 1940		7.6			7.6
1969	20L-Mainstem	18,219	2.0*	0.87*	2.10*	4.93*
	20S-South Fork	16,130	4.49	0.97	0.04	5.50
	20N-North Fork	9,904	5.96	0.28	0.03	6.28
	Total 1969		12.4*	2.1*	2.2*	16.7*
1986	20L-Mainstem	18,219	0.04*	1.47*	0.17*	1.69*
	20S-South Fork	16,130	0.84	0.27	0.03	1.14
	20N-North Fork	9,904	2.50	1.14	0.36	4.00
	Total 1986		3.4*	2.9*	0.6*	6.8*

* These values represent areas that were not fully covered by aerial photography and estimates were made of acreages. Given the possible large error in the number of acres these numbers are best used as a comparison between values within the mainstem. A range of acres was estimated and the high end of that range was used to calculate the acres of landslides per 1000 acres. This is expected to result in estimated values for the mainstem being higher than actual values.

The 1940 photos show that there had been no roads or areas of commercial timber harvest up to that time, and many active and inactive landslides gave evidence of an active landslide history.

The total area of landslides appearing in the Lobster Creek Watershed (20L, 20S and 20N) in 1969 is more than double the area in 1940, with nearly 75 percent of the landslide area being attributable to natural causes. It is thought that high natural values are due to the 1955 and 1964 flood events. At the time of the 1955 flood only 30 acres of the watershed had been harvested, entirely in 20L. By the time of the 1964 flood 28 percent of 20L, the Lobster Creek mainstem watershed, had been harvested, including nearly 50 percent of some smaller tributary watersheds (WAAs) within the mainstem watershed.

The landslide acres evident in the mainstem (20L) on the 1969 and 1986 aerial photos indicate that landslide area related to timber harvest and road construction is greater than the acres of naturally occurring landslides.

The amount of harvest-related landslide area visible in the mainstem (20L) in the 1969 flight is likely due to the intense levels of harvest using ground-based logging systems. By this time nearly 60 percent of 20L had been harvested. Skid roads were closely spaced and constructed on steep terrain. Harvest usually removed all commercial grade timber from units including riparian areas. Any trees still standing after harvest were felled before the unit was burned, and burning took place in the fall when fuel consumption was the greatest. These burning practices contributed to the effects of harvest on soil stability. Harvest during this era was concentrated in the mainstem watershed, where some watershed analysis areas had 100 percent of their area harvested. Increases in landslide acres associated with roads may be attributable to road construction practices that altered natural hydrologic function.

By 1986 the acres of landslides resulting from natural causes had decreased significantly from 1969 levels. During this period there were some increases in the acres of harvest-related landslides and a decrease in the acres of landslides associated with roads. The increase in harvest-related landslides is a likely result of harvest in riparian areas. Prior to the early 1970s few riparian buffer strips were left uncut. A high number of the harvest related landslides were associated with harvest along the steep inner channels of small and large streams. Typically harvest removed all of the trees in these conifer dominated areas. Conifer roots provide a large component of the soil shear strength, and their removal is likely to have been the cause of these landslides.

Through time landsliding in the watershed has been predominantly driven by natural causes. However, by 1986 it appears that observed landslide area from natural and harvest/road-related causes were nearly equal, but the total landslide area is significantly less than levels seen in 1969, as well as less than in 1940.

The existing road system has the potential to deliver sediment, primarily through drainage alterations that may trigger landslides, and through fill failures at stream crossings. An inventory of stream crossings and potential failure sites is discussed in the roads section of this document (page 51).

Information Needs: A relationship has been established between landslide size and depth for other rock types on the Siskiyou National Forest, and this has been used to estimate volumes of sediment on landslide inventories for watersheds such as the Elk River, Pistol River, and Grayback-Sucker. In order to determine landslide volumes in the Lobster Creek watershed, average depths of landslides on Colebrooke-derived soils would need to be determined.

Management Opportunities: Reduce potential sediment delivery from the existing road system by stormproofing or decommissioning roads.

What are the dominant hydrologic characteristics and processes in the watershed?

Natural Processes

The Lobster Creek watershed receives an average of 105 inches of precipitation per year, with a range from 90 inches near the mouth to 130 inches in the northeast corner of the watershed (Froehlich, McNabb, and Wida, 1982). Most precipitation falls as rain with 84 percent of the watershed in the rainfall dominated zone below 2,500 feet elevation. The remaining 16 percent of the watershed is in the transient snow zone on the ridges along the north and east boundaries (Elevation Zones Map). Compared to the Lawson Creek watershed, Lobster has similar annual precipitation, but it is probably more evenly distributed over the year. Lawson has intense winter rainfall with hot, dry summers. Lobster has summer fog, more drizzle, and less intense winter rain.

Lobster Creek does not have a streamflow gauge. Extrapolating from nearby gauges is problematic because of differences in geology, watershed elevation, and degree of marine influence. Major storm events in southwestern Oregon in recent years occurred in 1955, 1964, and 1996. In watersheds lying entirely on the ocean side of the first orographic divide, the 1955 storm is estimated to have had a return interval of 100 years, the November, 1996 storm somewhat less than that, and the 1964 storm, which regionally was the largest event of the three with rain on snow in the Cascades and other high elevation areas, the smallest of the three. However, the 1996 storm may have been a smaller event in the Lobster Creek watershed. Observed streamflow through a culvert in the neighboring Euchre Creek watershed was calculated as a 10 to 25 year event based on drainage size (Weinhold, 1999). This would be consistent with the few observed effects on streamside vegetation in 1996, compared to the effects of the 1955 and 1964 storm events.

Human Influences

The primary human influences on hydrologic processes are effects of roads and vegetation removal on peak flows. The following factors are indicators of areas where effects may have occurred (see Streams and Watershed Analysis Areas Map, Managed Stands Map, and Road Construction Dates Map).

- More than 20 percent of a watershed analysis area (WAA) harvested in a 20 year period may have increased water yield and minor peak flows. Partial hydrologic recovery is probable after 20 years.
- More than 20 percent of the transient snow zone harvested is likely to increase peak flows during rain on snow events. Hydrologic recovery is dependent on tree height in relation to surrounding forest, and is probable after 50 years.
- Road density greater than 4.0 miles per square mile is a surrogate for channel network expansion sufficient to increase peak flows.

Table 5. Timber Harvest and Road Construction*

Watershed Analysis Area	Percent Harvested before 1975	Percent Harvested after 1975	Total Percent Harvested	Road Density Mi/Sq Mi	Percent of Transient Snow Zone Harvested
20L01F	62	18	80	3.33	
20L02W	28	0	28	1.69	
20L03F	85	8	92	3.72	
20L04W	57	31	88	2.66	
20L05F	83	17	100	3.14	
20L06W	78	19	98	3.17	71
20L07F	82	6	88	3.68	65
20L08W	74	14	88	2.93	5
20L09F	56	26	82	2.04	
20L10W	13	21	34	3.25	19
20N01F	24	13	37	2.05	72
20N02W	7	9	16	2.28	27
20N03W	21	8	29	2.54	42
20N04W	10	23	33	3.24	37
20N05W	9	43	52	2.37	37
20N06W	0	16	16	2.25	3
20N07F	0	16	16	2.29	36
20S01F	24	8	32	1.75	
20S02W	8	90	98	3.95	
20S03W	52	0	52	3.47	
20S04W	12	10	22	2.83	22
20S05W	6	8	13	2.57	12
20S06W	9	17	25	2.91	25
20S07W	18	13	31	2.20	48
20S08W	39	13	53	2.33	77
20S09F	5	19	24	3.25	7

* Harvest data does not include portions of WAAs shown as "data not available" on the Managed Stands and Road Construction Dates Map.

Watershed analysis areas(WAAs) that are mostly likely to have experienced flow alterations as a result of timber harvest prior to 1975 are 20L01 through 20L09, all within lower Lobster (see Streams and Watershed Analysis Areas Maps).

WAAs that are mostly likely to have experienced flow alterations as a result of timber harvest since 1975 are 20L09 and 20L10 within lower Lobster, 20N04 and 20N05 within the North Fork, and 20S02 in the South Fork.

WAAs that are most likely to be experiencing altered flows as a result of harvest in the transient snow zone are: 20L06W, 20L07F, 20N01 through 05, 20N07, 20S04, 20S06 through 08. However, WAAs 20L06, 20N01,20N07 have few acres in this elevation zone.

None of the WAAs have road densities over 4.0 miles per square mile, but 20S02W is close to that density.

WAAs that are most likely to be experiencing altered flows at present, as a result of the combination of harvest and roading are:

20L07F	65 percent of transient snow zone harvested; road density 3.68 mi/sq mi
20N04W	37 percent of transient snow zone harvested; road density 3.24 mi/sq mi
20N05W	37 percent of transient snow zone harvested
20S02W	90 percent harvested in past 20 years; road density 3.95 mi/sq mi
20S07W	48 percent of transient snow zone harvested
20S08W	77 percent of transient snow zone harvested

These data on timber harvest and road densities are rough indicators of areas that may have been affected by these activities. Factors such as geology, soil depth, slope, and configuration of drainages influence the potential for effects. Some WAAs with high levels of harvest and roading may show little effect, or specific sites within WAAs with few of these activities may have noticeable effects. Streams draining managed areas in the watershed have not been evaluated in the field, in comparison to streams in less managed areas, to determine if their channels show evidence of altered flows.

Information Needs: Evaluate streams in areas with and without roads and harvest for evidence of altered flows.

Management Opportunities: Improve road drainage in areas where there is evidence of roads contributing to flow alteration.

What are the basic morphological characteristics of stream valleys and channels and the sediment transport and deposition processes in the watershed?

The mainstem of Lobster Creek has a gradient from 0.5 to 1.0 percent (see Stream Gradient Classes Map and Stream Profiles). At the mouth, the low water channel can be observed migrating back and forth across the large cobble deposits, from one photo year to the next. The deposition is caused by backwater from the Rogue River. There is little apparent difference in the size of depositional bars near the mouth before and after timber harvest and road construction began in the watershed. However, comparison is difficult because of differences in streamflow at the times the times the photos were taken.

The morphology of the Lobster Creek channel from the mouth to the confluence of the north and south forks was summarized in the Lobster Creek Level II Stream Survey of 1995.

Table 6. Channel Morphology

River Mile	Description
0.0 to 0.8	Wide valley floor, shallow stream depth and big point bars.
0.8 to 1.5	Canyon-like, steep side slopes with large boulders in channel. Long pools with short riffles.
1.5 to 1.8	Flat, aggraded with gravel-sized material.
1.8 to 3.5	Canyon with large boulders.
3.5 to 4.6	Wide valley with large point bars, side channels, pools and riffles, gravel
4.6 to 5.0	Small canyon, cascade and deep pools.
5.0 to 7.3	Wide valley with point bars and terrace, side channels and braids, long pools with short riffles. Deadline Creek and Fall Creek enter this reach.
7.3 to 7.7	Canyon-like and entrenched (below Coffee Butte).
7.7 to 9.0	Wide shallow riffles, glide-like pools. Lost Valley Creek enters at river mile 9.0, contributing 20 percent of flow.
9.0 to 9.9	Canyon with steep walls and small boulders, some ultramafic geology. Lost Valley Creek to confluence North and South Forks.

The North and South Forks have typical concave stream profiles, with disproportionately long stretches of gradients under three percent for streams of their size in mountainous terrain. These low gradient reaches contribute to their high fish production. Smaller tributaries are steeper.

Several inner gorge landslides along the segment of the South Fork from a mile below Boulder Creek to the mouth appear on the 1956 aerial photos, prior to harvest and roading. One is a reactivated slide that appeared to be healing on the 1940 photos. These were probably activated by the 1955 flood which removed riparian vegetation, widened the canopy opening, and aggraded the channel. On the later photos taken through 1988, these conditions persist with little change along a mile of the segment below the largest slide. Additionally, timber was harvested nearly to the channel along half of this aggraded mile in 1964 and 1965. On the 1997 aerial photos, riparian vegetation has grown and is covering more of the channel than in 1986.

Boulder Creek has a stepped profile with an anomalous flat gradient reach near the headwaters. The alternating flatter and steeper gradients create alternating transport and depositional reaches that delay the delivery of sediment downstream to South Fork Lobster Creek. Mining activities in upper Boulder Creek widened and aggraded the channel. Road 3237120 runs parallel to the stream channel and crosses it several times, but sediment contribution from the road appears minor in relation to the volume of bedload. The 1940 aerial photos show channels near the mouth of Boulder Creek altered by mining activity, but these channels appear natural today.

Boulder Creek is the only channel that shows recent disturbance on the 1997 aerial photos. There are three bank slides in the lower two miles of the stream, and one larger area of bank scour with large trees fallen into the channel about four miles upstream of the mouth, just below Bonanza Basin.

Lost Valley Creek has an unusual flat gradient reach in Lost Valley. Probable contributing factors to gradient anomalies here and in Boulder Creek are discussed under Geology.

Information Needs: Evaluate depositional reaches on site to determine if they have been affected by sediment delivery from roads and harvested areas. Complete road sediment risk inventory on National Forest land by identifying unstable road fill sites.

Management Opportunities: Treat roads that have been identified by road inventories as potential sources of sediment to streams, especially to critical fish production reaches.

What beneficial uses dependent on aquatic resources occur in the watershed? Which water quality parameters are critical to these uses?

Throughout the watershed, the primary beneficial use is the anadromous fishery. The Curry County youth camp located in the upper mainstem has a small water withdrawal. There are several swimming holes in the lower mainstem, and local residents use the gravel bars near the mouth for water-related recreation. Water quality factors that could influence these uses are temperature and turbidity. Activities that would affect other water quality parameters such as pollutants or excess nutrients are not found in the watershed.

Turbidity

Lobster Creek, like most streams in the area, has little turbidity except during winter storm events. The stream does not seem to have greater or longer lasting turbidity than other streams. Anecdotal observations indicate that human activities have not had lasting effects on turbidity in the basin.

Miners occasionally use four inch suction dredges in the Lobster Creek and South Fork Lobster stream channels. The amount of turbidity generated by these dredges depends on the particle size of the material they are moving. The bed material in Lobster streams contains relatively few fines, and minor turbidity has been observed for a short distance below these operations. Oregon State regulations require that turbidity plumes extend no further than the mixing zone, or 300 feet below the dredge. Research has found that the bulk of suspended sediment caused by dredging in a third order stream is redeposited within 11 meters (36 feet) downstream of the dredge (Thomas, 1985).

Temperature

Summer stream temperatures have been monitored by the Forest Service in Lobster Creek and its tributaries since 1990. The Lower Rogue Watershed Council, as part of the Lobster Creek Whole-Basin Restoration Project, began monitoring additional sites in 1997 (see Temperature Monitoring Sites Map). The 7-day average maximum stream temperatures exceed the present Environmental Protection Agency (EPA) and Oregon Department of Environmental Quality (DEQ) standard of 64 degrees Fahrenheit (F) for streams with cool-water fish species.

Table 7. 7-day average maximum stream temperatures. (See Temperature Monitoring Sites Map)

Map Site	Stream	Monitoring Site	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	Lobster Cr	mouth	68.0	68.7	68.6	65.0	66.4	66.3	66.7	67.5	68.5
2	Lobster Cr	below Deadline Cr								70.1	69.7
3	Deadline Cr	mouth								62.9	63.6
4	Lobster	remap site								69.4	
5	Fall Creek	mouth								62.6	63.1
6	Lost Valley Cr	mouth								60.6	61.7
7	NF Lobster	mouth	64.9	65.0	64.8	62.6	64.0	64.1	64.1	64.5	64.9
8	NF Lobster	3 miles up							62.7		
9	SF Lobster	mouth					66.8	66.6	66.8	67.7	68.6
10	SF Lobster	below fish structures							63.7		64.9
11	SF Lobster	Rd. 3310 bridge	62.4	62.3	63.0	60.2	61.2	61.6	62.2	62.4	63.0
12	SF Lobster	1 mi above bridge									59.8
13	trib to SF Lobs	mouth									60.0
14	Boulder Cr	mouth		64.1					63.4		63.0
15	Boulder Cr	Rd. 3237 bridge							61.3		

These data indicate that the major heating occurs in the South Fork of Lobster Creek between the Road 3310 bridge and the mouth of the South Fork. This heating reach has a broad, shallow channel within a rocky, sparsely vegetated inner gorge. Lobster Creek continues heating until it reaches Deadline Creek, and then cools from there to the mouth. Oregon Department of Fish & Wildlife (ODFW) reports that many subsurface springs in the mainstem offset solar heating in this segment. Possible causes of these subsurface springs are discussed under Geology.

Openings in the riparian canopy along stream channels were somewhat wider in the 1969 aerial photos than in previous years, probably as a result of the 1955 and 1964 flood events. On the 1997 photos, most riparian areas are well-vegetated with hardwoods, except along the Boulder Creek stream segment, and is discussed under Channel Condition.

To assess present stream shade condition on perennial streams, the age of riparian vegetation throughout the watershed was estimated based on information available in the Siskiyou National Forest Geographic Information Systems (GIS). Within the National Forest and the State of Oregon land, this data is interpreted from satellite imagery (PMR). On John Hancock and BLM land, the stand origin dates were used. On other privately owned land, an estimate of age was made based on the overall appearance of the vegetation on the 1997 aerial photos. These estimates are general, inconsistent between ownerships, and intended only to give a rough indication of streamside vegetation.

The widths of riparian areas considered for this GIS data were the interim riparian widths from the Northwest Forest Plan ROD for National Forest lands (USDA and USDI, 1994). For other ownerships, a width of 100 feet each side of Lobster Creek and 50 feet each side of its tributaries was used as an approximation of Oregon Forest Practices riparian widths (see Riparian Management Areas Map). Actual widths are based on stream size and beneficial use. A more site-specific evaluation of riparian condition as it affects stream temperature would examine vegetation height and density within a riparian width that would vary by topography and aspect.

Table 8. Riparian Seral Stages From GIS Data*

WAA	Riparian Acres	% Late Seral	% Mid Seral	% Early Seral	% Pioneer	% Rock	% Mid & Late Seral
20L01F	140	4	11	64	16	6	15
20L02W	38	5		95			5
20L03F	86			88	12		
20L04W	48			96			
20L05F	131			94	6		
20L06W	63			89	10		
20L07F	93	3	2	86	9		5
20L08W	67	3	3	94			6
20L09F	225	8	4	77	11	1	12
20L10W	624	37	5	25	33		42
20N01F	543	45	4	30	21		49
20N02W	392	40	3	30	26		43
20N03W	345	33	1	39	26	1	34
20N04W	333	56	5	15	24		61
20N05W	244	63	4	13	19	1	67
20N06W	263	76	2	10	13		78
20N07F	309	64	3	21	12		67
20S01F	635	37	10	24	28	1	47
20S02W	51	16	2	75	6		18
20S03W	62	47	2	39	13		49
20S04W	803	33	7	19	39	2	40
20S05W	462	56	6	19	19	1	62

WAA	Riparian Acres	% Late Seral	% Mid Seral	% Early Seral	% Pioneer	% Rock	% Mid & Late Seral
20S06W	317	50	5	15	28	2	55
20S07W	446	57	2	26	15		59
20S08W	402	35	2	43	20		37
20S09F	248	56	5	13	25		61

* Because PMR data were included here, the same age categories were used to define seral stage as those used in the PMR data in the Wildlife section of this document:

Pioneer- 0 to 10 years
Early- 11 to 60 years
Mid- 61 to 100 years
Late- Over 100 years

Only in WAA 20N06W does the riparian cover approach the 80 percent usually considered to be the natural condition for Douglas-fir forest. Aerial photo analysis and field observations could find that actual riparian cover provided by hardwoods and smaller trees is providing good stream shading in other WAAs.

The riparian condition on non-Federal land was evaluated for the Lobster Creek Partnership, through the Curry County Soil and Water Conservation District in 1998. The assessment was primarily accomplished through a survey of aerial photos, augmented by a field survey of 20 sites. The results of this survey will be incorporated in the Water Quality Management Plan for the Lobster Creek Watershed.

Information Needs: There is a need for an aerial photo survey of historic and present riparian conditions on National Forest lands.

Management Opportunities: Riparian areas that are understocked with conifers, or where conifer growth is slowed by overstocking or competing species of vegetation, need to be silviculturally treated. Roads that were identified in the road inventory as having the potential to deliver sediment to streams and remove riparian vegetation or increase the water surface area exposed to solar heating need to be treated.

What is the character of fish habitat in Lobster Creek?

Fish use in Lobster Creek is shown on the Fish Distribution Map and centers around three critical reaches where anadromous species both spawn and rear in high densities. The first reach is a 2.3 mile segment of the mainstem near Deadline and Fall Creeks. This reach is especially important for chinook spawning and rearing. The second critical reach is the North Fork from its mouth to a point 5.0 miles upstream. This reach is inaccessible to salmon but has the highest densities of steelhead and cutthroat in the basin. The third critical reach is 2.2 miles of the South Fork near Iron and Boulder Creeks. This is the only reach where coho rear. Many chinook and steelhead also use the South Fork critical reach. Critical areas for resident trout are Fall Creek, Deadline Creek, and Lost Valley Creek.

These critical fish production reaches were identified as "source areas" by the Lobster Creek Whole-Basin Restoration Partnership. The partners are Curry Soil and Water Conservation District, Hancock Timber Resource Group, Lower Rogue Watershed Council, Oregon Department of Fish and Wildlife, Pacific Rivers Council and the Siskiyou National Forest. The partnership is coordinated by Watershed Initiatives in Eugene, Oregon. The goal of the partnership is to develop a whole basin restoration strategy for Lobster Creek. The fish source areas were determined by the partners through snorkel surveys. Watershed restoration projects in the basin are prioritized to protect and improve fish habitat in the source areas.

Fish habitat in the mainstem, North Fork, and South Fork Lobster has been inventoried for the past five years. In the time since these surveys no major alteration of fish habitat has occurred. The largest storm during this period was the November 1996 storm. Damage from that storm was severe in the Elk and Coquille Rivers to the north of Lobster basin and also in the Quosatana and Foster Creek basins to the east and south of Lobster basin. However, Lobster Creek sustained neither the severe road damage nor channel changes seen in the other basins. Fall chinook distribution to spawning grounds, however, was aided by that high water. The New Years Day storm of 1997 was an inland storm and provided less precipitation to Oregon coastal basins south of Cape Blanco than the previous November. Aerial photographs of the basin taken in the summer of 1997 and visits to stream reaches have shown no important changes in fish habitat following the 1996/97 winter storms.

Lobster Creek Mainstem

Fish habitat in Lobster Creek was surveyed in 1995 from its confluence with the Rogue River to 10 miles upstream where it branches into the North and South Forks. The mainstem is aligned north-to-south and has a very simple drainage pattern. Most of the tributaries are short face-drainages that do not offer more than a few hundred feet of fish habitat, but which, cumulatively, are likely providing important slackwater refugia during high flows. The three main fish-bearing tributaries are Fall, Deadline and Lost Valley Creeks, each of which is most notable for its resident fish habitat.

The mainstem channel flows through a V-shaped canyon and averages a 1 to 2 percent gradient with no barriers to fish migration. It flows under 2 bridges and through no culverts. Except for the first mile above the mouth, Lobster Creek is moderately entrenched and dominated by cobble, gravel and sand. Spawning gravel is abundant and clean.

The pool to riffle ratio (pool:riffle) in the mainstem Lobster is quite good. A desirable standard is 40:60. All but one of the 10 reaches of the mainstem exceed this ratio. Pools in the mainstem are long with long tailouts. However, there are few per mile (5 to 25 for the 10 reaches.) Coupled with the scarcity of large wood to partition the pools, fish habitat in Lobster Creek is less complex than optimal.

Large wood in the channels is important for storing sediment, partitioning habitat, producing invertebrates, providing instream cover and creating eddies for fish to rest in. Abundance of large wood is low in the mainstem as well as throughout the basin. The 1995 survey detected 0 to 9 pieces of large wood (36 inches diameter by 50 feet) and 1.6 to 12.7 medium pieces (24 inches by 50 feet) per mile in each of the 10 reaches composing the mainstem. The Level I team for Endangered Species Act consultation for federal actions in southwest Oregon considers a stream with fewer than 10 pieces of large or medium wood per mile as "Not Properly Functioning"; between 10 and 25 pieces of large wood is considered "At Risk"; and more than 25 pieces per mile "Properly Functioning". The North and South Forks of Lobster have slightly more wood than in the mainstem. Considering that the mainstem has nearly double the flushing power of either the North or South Fork, lower densities of large wood would be expected in the mainstem. Wood densities in Lobster Creek are comparable to those in other lower Rogue tributaries with watersheds greater than 10,000 acres.

Future sources of large wood for channels are trees within tree height of the channel and trees in landslide prone areas. The 1995 survey analyzed the character of forests adjacent to the mainstem channel. Much of the inner riparian zone (within 30 feet of the channel) had been harvested and very few large trees were found here. Inner riparian species are red alder, myrtle, big leaf maple, ash, willow, and some large conifers. The outer riparian zone (30 to 100 feet out) had large trees only in two reaches. Small Douglas fir, alder, myrtle, and canyon live oak dominate the outer zone, with scattered conifers of other species. Conifer seedlings have been planted in some riparian areas along the mainstem to improve this condition. However, recovery of large trees is a long-term process and significant improvement in large wood available for delivery to the channel will not occur for many decades.

Forest road 3310 parallels the mainstem on its east bank for its entire length. It crosses many tributary streams with culverts, and only Fall Creek has a bridge. An inventory of road culverts uphill of the source areas defined by the Lobster Creek partnership (see discussion under fish habitat) was completed in 1998. The inventory identified culverts which are either undersized, reaching the end of their service life, or presenting other risks of delivering sediment to streams. Many of the high priority culverts on John Hancock land have already been replaced or maintained, and additional future work is planned. Fish passage through the culvert at Deadline Creek was improved and large wood was added to Deadline Creek between the culvert and Lobster Creek.

Lobster Creek has been identified as temperature-limited by the DEQ because peak 7-day average maximum summer water temperatures regularly exceed the standard of 64 degrees Fahrenheit. Virtually all streams large enough to support significant populations of fish on the south coast exceed 64 degrees in the summer time. This includes streams in wilderness areas which have no significant alteration by humans. Peak 7-day average maximum water temperatures at the mouth of Lobster Creek have ranged between 65 and 69 degrees since 1990.

The interesting feature of water temperature in Lobster Creek is the cooling which occurs along the mainstem between Deadline Creek and the mouth of Lobster Creek. The typical local pattern is for heating to occur in the mainstems. Temperature data collected in 1997 and 1998 (see Table 7) show typical heating occurring along the mainstem between the mouth of the South Fork and Deadline Creek, and then cooling of one to two and a half degrees Fahrenheit between Deadline Creek and the mouth of Lobster Creek. Factors that contribute to this cooling are the topographic shading in the steep canyon reaches and the cold groundwater filtering into the mainstem These are discussed in the Geology section of this document.

North Fork Lobster Creek

Fish habitat in the North Fork Lobster was surveyed in 1994. The first one-third mile of North Fork is a moderately steep (5 percent), deeply entrenched reach with cascades and a cobble and small boulder bottom. It is not passable for chinook adults. Consequently, only steelhead and cutthroat spawn and rear in the North Fork. Upstream of this first "chute" the channel is lower in gradient (2 to 3 percent) with a gravel and cobble bed well-suited for spawning. The North Fork flows through a V-shaped valley, is moderately entrenched, and has little floodplain development.

Large and medium-sized wood densities range from 6 to 19 pieces per mile. The lowest density of in-channel wood occurs between river miles 2.0 and 2.7. This is the only reach where timber harvest occurred immediately adjacent to the main channel. Overall instream cover for fish is very high (40 to 100 percent of the surface area), in the form of boulders, bubble curtains and, to a lesser degree, wood. High amounts of instream cover partition habitat, allowing a greater number of individuals to occupy a pool.

Excepting the 0.7 mile reach where the timber harvest occurred adjacent to the stream, the riparian condition is very good and highly diverse. Large Douglas-fir and Port-Orford-cedar are the primary species, with bigleaf maple, red alder, vine maple, western hemlock and myrtle also present. Canopy closure ranged from 20 percent to greater than 60 percent.

Peak 7-day average maximum water temperatures at the mouth of North Fork ranged from 62.6 to 65 degrees between 1990 and 1998. Since steelhead and cutthroat of multiple age classes are in freshwater during the summer they are very vulnerable to high temperatures, in contrast to chinook which migrate out before peak temperatures occur. North Fork provides a good temperature regime for the fish using it.

No stream enhancement work has occurred in the North Fork. However, densely-stocked previously harvested riparian stands along non-fish bearing streams have been thinned to improve growth of large trees. This will improve the overall health of the aquatic system and restore riparian processes contributing to high quality fish habitat downstream.

South Fork Lobster Creek

Fish habitat in the South Fork Lobster was surveyed in 1996. The stream flows through moderate V-shaped, alluvial and colluvial canyons. All reaches are entrenched with very little floodplain development. Stream gradients in the lower 5 miles are 1 to 3 percent with cobble and gravel beds. Roughly half of the surface area of the stream is in pools, the other half is riffles.

Large and medium sized wood occurs at an average of 12 pieces per mile, which is less than the North Fork but more than the mainstem. Boulders and bubble curtains provide most of the instream cover for fish.

The riparian habitat is diverse and in good condition. Dominant conifer species are Douglas-fir and Port-Orford-cedar. Dominant hardwood species are red alder, bigleaf maple, and myrtle.

The lower three miles of the South Fork flow through a steep canyon with many active landslides and sparse, serpentine-related vegetation. This is where water heating occurs during the summer months. Temperature monitoring in 1995, 1996, and 1997 detected a five degree increase in peak temperatures in this reach. Upstream of the exposed reach, in the critical fish production reach, peak 7-day average maximum water temperatures have been about 62 degrees F since 1990. This is good for trout and salmon.

Many of the non-fish bearing headwater streams have had timber harvest and are densely stocked with small trees. They are good candidates for thinning to improve development of large trees. Large wood was placed in the critical fish production reach of the South Fork to improve fish habitat in the late 1980s and early 1990s.

What is the character of fish populations in Lobster Creek?

Salmon and trout in Lobster Creek are members of the lower Rogue River stocks. They share life histories and population trends with salmonids produced from the mouth of the Rogue River upstream to near Stair Creek at river mile 43 of the Rogue, excluding the Illinois River, which enters at Rogue River mile 27.

Most fish production in the lower Rogue basin occurs in tributaries. Winter flows in the mainstem are believed to be too powerful to allow successful incubation of fish eggs in all but the very mildest of winters. High storm flows can mobilize the bottom of the stream and destroy eggs laid in the gravel. The lower Rogue River is predominantly a canyon with short, steep tributaries. Few tributaries have well-developed habitat for salmonids. Besides Lobster Creek, only Edson, Saunders, Kimball, Quosatana, Silver, Shasta Costa, Foster and East Creeks offer more than a half-mile of salmonid habitat. Of these, Lobster Creek has far more habitat and produces more fish than any other. This makes Lobster Creek the most important fish producing unit in the lower Rogue River.

Characteristics of lower Rogue River salmonids are that fish spawning here tend to enter the river at the end of the adult migration runs, the juveniles enter the ocean earlier than upriver fish and in the ocean, they migrate south and stay close to shore (Rivers, 1991 and Meehan and Bjornn, 1991).

Lower Rogue River fish have shared the historic decline in numbers witnessed throughout the Rogue River since the late 1800s. The most telling example of the decline is the output of the salmon canning industry centered out of Gold Beach, at the mouth of the Rogue. Fish caught in the river from the mouth up to Lobster Creek were the basis of the industry. In 1861, entrepreneurs in the fish canning industry labelled Rogue River runs as large, or larger, as any in Alaska. A canning industry thrived at Gold Beach into the 1930s. At the peak of fish canning, packs contained up to 82,500 adult chinook in 1917 and 50,500 adult coho in 1928. However, when the state legislature finally banned commercial fishing on the Rogue River in 1935, the action was virtually unopposed because fish were so scarce the canning industry could not support itself (Rivers, 1991). Besides overharvest, factors contributing to this initial steep decline of Rogue River fish included dams, mining activities, water diversions, and climate cycles in the upper basin (Rivers, 1991).

Four species of the genus *Oncorhynchus* (Pacific salmon and trout) use Lobster Creek. Coho (*O. kisutch*) and chinook (*O. tshawytscha*) are the traditional Pacific salmon. All individuals must migrate to the ocean and each adult is capable of making only one spawning run from the ocean, after which it must die. *O. mykiss* (the Latin name for both steelhead and rainbow trout) and *O. clarki*, cutthroat trout, have more flexible life histories. Both resident and anadromous populations of each exist in Lobster Creek, individuals can make more than one return migration to freshwater and individuals can spawn more than once in their lifetime. These life histories are typical of the species throughout their ranges, not just in Lobster Creek or the Rogue River.

Non-salmonid species of fish in Lobster Creek include the anadromous Pacific lamprey (*Lampetra tridentata*), whose populations are suspected to be in decline throughout their range, yet about which very little is known. There are potentially three species of sculpin (genus *Cottus*) in Lobster Creek: coast range (*C. aleuticus*), prickly (*C.asper*) and reticulate (*C. perplexus*). Redside shiners (*Richardsonius balteatus*) are a non-native minnow first detected in the Rogue River in the 1950s in Jump Off Joe Creek (Rivers, 1963). In Lobster Creek, they occur in the first mile of the mainstem upstream of its confluence with the Rogue River. Juvenile northern squawfish (*Ptychocheilus oregonensis*) have been caught in the trap at the mouth of Lobster Creek. No adult squawfish have been seen in Lobster. Three-spined sticklebacks (*Gasterosteus aculeatus*) have been caught in the trap and observed in the lower mainstem. Brook lamprey have not been seen in Lobster Creek, but their presence is suspected due to their abundance in the Rogue River.

Coho Salmon

Coho in Lobster Creek are part of the Southern Oregon/Northern California group, which was listed as Threatened under the federal Endangered Species Act in 1997. The distribution of these coho extends from the Elk River in Oregon south to the Mattole River in California. The estimated abundance of these coho in the 1940s ranges from 150,000 to 400,000 spawning fish. Today, the group is down to approximately 10,000 naturally produced adults and the Rogue River is one of the major remaining producers (NMFS, May 6, 1997). Within the Rogue River, coho predominately spawn and rear in the upper Rogue and the Illinois Rivers. The upper Rogue population is mostly hatchery fish. Most wild coho production in the Rogue occurs in the Illinois River tributaries. The population of adult spawners in the Rogue River was calculated for the years 1990 through 1996 based on mark and recapture seining at Huntley Park, a point 2 miles downstream of the mouth of Lobster Creek. During that time, coho adults averaged 3401 individuals, with a low of 174 in 1993 and a high of 5386 in 1996 (Nickelson, 1998). The same report estimates that a total of 5400 adult spawners are needed to fully seed the best habitat. Although coho densities in Lobster Creek are very low relative to the upper Rogue, there is more coho production here than in any other lower Rogue River tributary. Because of the lack of classic coho habitat features, lower Rogue spawners are believed to be strays from the upper Rogue River or Illinois River groups and not remnants of a discrete lower Rogue River population. However, it is likely that when coho populations were higher, a larger number of strays used the marginal habitat available in Lobster Creek.

Adult coho enter Lobster Creek in the late fall to spawn. Eggs incubate in gravel streambeds until early spring when the fry emerge. Juvenile fish will stay in Lobster Creek for over one year congregating in the medium-sized streams. They migrate out of the system in late spring of their second year of life. Most Rogue River coho spend two years in the ocean before returning to spawn (Rivers, 1963). Since juvenile coho spend a full year in mid-sized streams they depend on high quality habitat features throughout that year. High summer water temperatures (in the upper 60 degrees Fahrenheit), little instream cover or slackwater areas to escape high flows in winter and a general low-density of instream wood, are habitat features of the mid-sized streams in Lobster Creek that do not promote coho production. These conditions are typical of mid-sized streams in the coast range of southern Oregon, where coho production is low. These conditions do not affect other salmonids to the degree that coho are affected. Chinook migrate out of Lobster Creek by mid-summer and do not overwinter, avoiding high water temperatures and high flows. Steelhead and cutthroat rely on smaller tributaries which are cooler in summer and have lower flows in winter.

Coho occur in low numbers in Lobster Creek, predominantly in the mid-section of the South Fork. In September, 1997 Lobster Creek was snorkel surveyed for juvenile salmonid abundance and distribution. Juvenile coho were confined to the South Fork and were estimated to number 2,390, which was an order of magnitude lower than the steelhead estimate (Dewberry, 1997). A smolt trap at the mouth of Lobster Creek was monitored March through August of the following year, 1998. A total of 101 coho smolts were trapped and an estimated 250 to 300 coho smolts moved past the trap during that time, which was an order of magnitude lower than steelhead, and two orders lower than chinook figures (ODFW, 1998).

Fall Chinook

Fall chinook in Lobster Creek are part of the Southern Oregon and California Coastal Evolutionarily Significant Unit (ESU). The proposed range of this ESU is from the Rogue River south to the northern entrance of San Francisco Bay in California. This ESU is proposed for listing as Threatened under the federal Endangered Species Act.

Fall chinook salmon in the upper Rogue River have been identified by NMFS (March 9, 1998) as the only relatively healthy population in the entire ESU. This is a stream-type stock, meaning that juveniles typically enter the ocean during the second year of life, migrate further distances in the ocean, enter freshwater as spawners early in the fall and then migrate long distances to headwater streams (Healy, 1983). Lower Rogue River chinook (including those in Lobster Creek) are ocean-type fish meaning that they typically enter the ocean within the first year of life and stay relatively close to shore, then enter freshwater to spawn late in the fall and occupy habitat low in the system. At the upper mainstem Lobster Creek spawning survey reach near Fall Creek, the ODFW has detected as many as 211 chinook spawners in 1987 and as few as 2 in 1990 and 1991.

During the late 1980s, the combination of drought, stream habitat degradation, low ocean survival and high ocean exploitation rates in the Klamath Management Zone resulted in a severe decline in chinook populations in all of the Oregon coastal basins south of Elk River. River angling for chinook in several southcoast basins, including the lower Rogue River, had been closed during this time. Populations began to improve in 1991 with a sharp curtailment in ocean harvest coupled with the end of drought conditions by 1993 (ODFW, 1997). Juvenile trapping data show a positive trend in smolt production in Lobster Creek since the early 1990s (Table 9). The sport angling season in the lower Rogue River still closes on September 30 to protect these chinook. Prior to September 30, the fishery in the lower mainstem is targeting chinook which spawn in the upper Rogue River.

Adult fall chinook enter Lobster Creek in early November and disperse throughout the watershed to spawn as streamflow allows. The primary chinook spawning areas are in the South Fork and mainstem. Spawning is usually completed by the end of December, after which all chinook die. Fry emerge from the gravel in the spring and start migrating downstream almost immediately. Downstream migration in Lobster Creek peaks between the end of May and the middle of July and then continues at a declining rate throughout the summer (ODFW, 1997). During mild winters some juveniles can stay in Lobster Creek. In the spring of 1998, 123 one-year old chinook were caught in the Lobster Creek juvenile migrant trap. After migrating out of freshwater, these chinook will spend two or three years in the ocean before returning to spawn.

A snorkel survey of Lobster Creek in May of 1997 identified two reaches as important for juvenile chinook rearing. The South Fork Lobster above and below Boulder Creek and the mainstem Lobster above and below the mouth of Fall Creek had the highest densities of chinook. An estimated 33,205 juvenile chinook were in the basin that May (Dewberry, 1997).

Table 9 shows the results of juvenile chinook trapping in Lobster Creek between 1995 and 1998. Direct year-to-year comparison of the data is not possible, since the population estimate is based on not only the number of chinook migrating each year, but on the vagaries of operating a trap. Prohibitively high flows, mechanical problems and vandalism vary between years.

Table 9. Juvenile Fall Chinook Trapping Results In Lobster Creek (ODFW 1997, 1998).

Trap Year	Population Estimate
1995	7,283
1996	32,877
1997	150,540
1998	75,394

Winter Steelhead

Winter steelhead in Lobster Creek are part of the Klamath Mountains Province (KMP) ESU. This ESU was propo as Threatened under the Endangered Species Act in 1996. However, in 1998 the ESU was determined to not warr such a listing, based on recovery efforts in the states of Oregon and California. The ESU extends from the Elk Ri in Oregon south to, and including, the Klamath River in California. The NMFS estimates the current abundance o this ESU to be 85,000 with an historic abundance of greater than 275,000 (NMFS, July 1996). The ODFW estim that the population of winter steelhead in the Rogue River between 1970 and 1987 averaged 44,000 adult spawner annually. The same estimate since 1990 is 55,000 adults, which indicates a positive trend in the population (RVC 1997).

Winter steelhead spawn throughout Lobster Creek, into even the small tributaries. Snorkel surveys in 1997 found juvenile steelhead in all the tributaries surveyed. The North Fork had especially high numbers of steelhead. Base smolt trapping efforts in 1997 and 1998, Lobster Creek produced an estimated 8,000 and 9,700 steelhead smolts respectively those years.

Steelhead have a more variable life history than coho or chinook. They can spend one to several years rearing in freshwater and can survive reproduction to return to the ocean. In streams their sleek body proportions allow them ascend steeper gradients and use smaller streams for spawning and rearing. They also roam more within a basin to locate suitable spawning habitat. Winter steelhead enter Lobster Creek to spawn in the winter and spawning conti into April. Fry emerge from late spring to early July. Most steelhead in Lobster Creek will spend almost 2 full ye rearing in freshwater before smolting and migrating to the ocean in the spring. After typically 2 years of ocean rea they will return to spawn. A small percentage of the population will return to freshwater after only one year. The so-called "half-pounders" are sexually immature and will return to the ocean again before making a spawning run.

Anadromous Cutthroat Trout

Both resident and anadromous cutthroat trout occur in Lobster Creek. Multiple age-classes of cutthroat are consistently present in coastal Oregon streams and forces driving their complex life histories are poorly understo (ODFW April, 1997). Anadromous cutthroat usually rear in freshwater for two, three or four years before smolt Yearling cutthroat appear to be displaced from prime habitat by other salmonid yearlings, probably because they emerge later and are, therefore, smaller. They commonly return to freshwater to overwinter without spawning. Females begin spawning at age 4 and can survive to spawn up to 4 or 5 times. Spawning occurs in late winter an early spring. (Trotter, 1997).

Snorkel surveys of Lobster Creek in May and September of 1997 revealed juvenile cutthroat in very low number most reaches. Smolt trapping in spring and summer of 1998 allowed a population estimate of 800 cutthroat smol leaving Lobster Creek that season. Adult sea-run cutthroat have been seen in the pool at the confluence of the So Fork and in the North Fork.

Resident Trout

Both rainbow and cutthroat trout occur in resident forms in Lobster Creek streams. The most important reaches f them are Deadline, Fall and Lost Valley Creeks. They also occupy the uppermost reaches of most tributaries and commingle with the anadromous forms throughout the basin.

Management Opportunities: The culvert at Iron Creek on Road 3310 needs to be replaced. It is currently a barrier to anadromous fish and blocks approximately 0.5 miles of suitable habitat. There is a need to prevent sediment delivery from roads throughout the basin. Riparian forest conditions which have experienced previous harvest, especially adjacent to fish-bearing streams, need to be improved.

Coho are strongly associated with wood in streams. Increasing instream cover (with brush bundles or large wood) in the South Fork critical reach would improve summer rearing habitat for coho. However, since winter conditions appear to be limiting coho production, improving summer habitat would likely not have a major effect on production. There is no practical way to widen the narrow valley, create extensive backwater habitat and improve winter conditions for coho.

RIPARIAN ECOSYSTEM NARRATIVE

What are the riparian processes in the watershed?

Riparian areas provide both food production and suitable physical habitats for fish. Both are necessary to sustain salmonid production (Murphy and Meehan, 1991). There are two sources of energy for biological organisms in stream ecosystems: **autochthonous sources** (photosynthesis by aquatic plants in the stream itself), and **allochthonous sources** (decomposition of organic matter imported from outside the stream). The mix of energy sources has a major influence on the structure and function of stream ecosystems (Murphy and Meehan, 1991).

Autochthonous sources of energy are affected by stream size, gradient, and exposure to sunlight. Allochthonous sources of energy contribute organic matter to the stream by four main pathways: litterfall from streamside vegetation; groundwater seepage; soil erosion; and fluvial transport from upstream. Organic matter from these sources differs in when and how it enters the stream, how it decays, and where it predominates (Murphy and Meehan, 1991).

Most animals require food with a Carbon to Nitrogen ratio (C:N) less than 17:1 (Russell-Hunter, 1970). Almost all forms of allochthonous organic matter have higher C:N ratios, so they require microbial processing to enhance food quality. The quality of various forms of organic matter varies widely, as measured by the C:N ratio. At the low nutritional end of the spectrum are woody debris and conifer needles (wood has a C:N ratio of 1,343:1); at the high end of nutritional quality are periphyton, macrophytes, and fast-decaying deciduous leaves (macrophytes 8:1 and alder leaves 23:1) (Murphy and Meehan, 1991).

Intermittent Streams

An intermittent channel is defined by the Record of Decision (ROD) as "any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition" (ROD, B-14). This definition includes both "ephemeral" channels and "intermittent" channels. These two types of channels are distinguished by flow: ephemeral channels carry only stormflow, while intermittent channels are supplied by groundwater during part of the year (Reid and Ziemer, 1994).

The biological importance can be different for ephemeral and intermittent channels and is dependent primarily on the presence of water and distinctive riparian vegetation. Most ephemeral channels contain water for only a few days of the year and may not support riparian vegetation, so they are unlikely to have much on-site biological significance. Their major biological role is likely to be their influence on downstream channels through their supply of sediment, water, and organic materials, and management of their physical role may be adequate to preserve their biological function. They are likely to require special biological analysis and modified protection for biological resources only if there are biological considerations at these sites that are not captured by an analysis of sediment, water, and organic materials (i.e.. such as their use as migration corridors, or the presence of unique wildlife species) (Reid and Ziemer, 1994).

Intermittent channels in the Lobster Creek watershed are important to fish resources as seasonal sources of water, sediment, allochthonous material, and large wood. Because intermittent channels can form a high proportion of the entire channel system in a watershed, they contribute a lot of nutrients to downstream reaches (Reid and Ziemer, 1994). It is therefore important to maintain their allochthonous material input. These small streams are the most easily influenced by forest management activities and any manipulation of the canopy or streambank vegetation will influence the streams energy supply (Chamberlain et al., 1991).

Intermittent channels can also be important to amphibians. Most amphibians require water for reproduction, and some need open water throughout the year. These streams may be particularly important as nursery areas for amphibians because these sites support fewer predators than perennial channels (Reid and Ziemer, 1994).

Conifer riparian areas have a moist microclimate that is important to a variety of amphibians. For example, Pacific giant salamanders utilize headwater streams to lay their eggs (Stebbins, 1966), and talus habitat in these moist areas can be important for Del Norte salamanders.

Intermittent channels and associated riparian zones provide an important source of food and water for hillslope ecosystems, they can function as travel corridors, and they can provide microclimatic refuge for hillslope animals during times of thermal stress (Reid and Ziemer, 1994). The distinctive vegetation and higher moisture content of these sites can modify fire behavior, so their distribution can affect the patchiness of large burns.

Perennial and Fish Bearing Streams

Keeping in mind the logic used to discuss "biological significance" for intermittent streams, perennial streams would be more significant biologically than intermittent streams. The ROD stated that "although Riparian Reserve boundaries may be adjusted on permanently-flowing streams, the prescribed widths are considered to approximate those necessary for attaining Aquatic Conservation Strategy objectives" (ROD, B-13). Also, these approximate widths are necessary to maintain riparian processes.

The importance of fish bearing streams is discussed under the fisheries, hydrology, and geology sections of this watershed analysis. In general, salmonids are affected by both the physical conditions of their habitat, and the energy flow processes occurring in the watershed.

What are the vegetative types of riparian areas in the watershed?

Riparian zones in the Lobster Creek watershed can be stratified into four distinct categories based on vegetative characteristics. These are conifer forest, hardwood forest, meadows, and riparian areas on soils developed in serpentinite and peridotite (ultramafic soils). Each category has its own processes for sediment delivery, channel formation, hydrologic regime, susceptibility and response to change, microclimate qualities, flora, fauna, and migration habitat qualities. Potential riparian restoration sites have been identified in the large wood, sediment delivery, and fish habitat discussions.

Conifer Forest Riparian

The most abundant riparian type in the Lobster watershed is the conifer riparian forest. It is generally located on soils with high to moderate productivity, where water supply is not limiting growth and topography tends to exclude frequent or intense fire. Abundant, tall conifers dominate these riparian areas. Douglas-fir is by far the most common overstory conifer, with Port-Orford-cedar often present. Pacific yew has very scattered distribution.

The stand canopy is closed in these areas and many stands have multi-layered canopies. Hardwood trees are often an important mid-layer component. Conifers, with the exception of cedars, create more acidic soils through litterfall than hardwoods. The evapotranspiration associated with the numerous large trees is high. Air temperatures are cool and diurnal fluctuations are moderated throughout the year. These riparian ecosystems maintain important microclimates.

The stands are generally very stable. Tanoak seldom reaches climax condition due to the time-span required for this succession and the longevity of dominant conifers (200 to 300 years). Fire does not start or carry well in most of these stands. Light disturbance from windthrow, land movement, wind or snow damage leads to continual recruitment of conifers. In the event of large scale disturbances these riparian stands are slow to recover to a mature state. Where Port-Orford-cedar is present in the riparian zone, roads and streams are important conduits for *Phytophthora lateralis* (Port-Orford-cedar root disease).

Conifer stands often have a higher percentage of perennial streams than other vegetation types. Root strength and often dense undergrowth contribute to generally stable stream banks. However, riparian conifer stands can develop on earthflows, and exhibit features of deep-seated instability. Earthflows can be important sources of structure for stream channels by providing boulders and large wood. Throughout conifer riparian areas, large wood in the form of limbs and boles is continuously delivered to and incorporated into the channels. Stream temperatures tend to be cool throughout the year. Tall trees can shade even moderately wide channels in summer.

Where coniferous riparian areas are surrounded by similar upland stands they are important water sources for interior habitat-dependent wildlife. When they are dissimilar to the surrounding upland habitat, they are important uphill-downhill dispersal corridors for interior species. Stable air temperatures make them valuable thermal refugia in extreme weather for many wildlife species. These riparian stands can be important habitat for spotted owls.

Riparian stands of red alder are generally an early to mid-seral stage of the riparian conifer forest. These stands were usually created by stand replacement events such as timber harvest, debris flows and inner gorge landslides. In some areas red alder is an important component of a mature conifer riparian ecosystem. These alder stands can be important habitat for white-footed voles, and alder leaves are a good source of nutrients for the aquatic ecosystem.

Because of its abundance and high value wood production, more land use activities have occurred in conifer riparian stands than in any of the other riparian types. Therefore, conifer riparian stands are most likely to be candidates for restoration.

Hardwood Forest Riparian

Hardwood-forested riparian stands tend to replace conifer-forested riparian stands where water is limiting or where a regime of either frequent low intensity or high intensity fires has disturbed the riparian zone. Hardwood riparian stands are dominated by tanoak trees, with madrone, myrtle, chinquapin, knobcone and sugar pines often present. Scattered conifers such as Douglas-fir will grow directly out of the stream channel, where there is more water, but they are anomalies in these stands.

Although the canopy is closed, the single-storied structure does not have the insulating qualities of the conifer forest. Humidity is much lower and air temperatures vary a great deal with the seasons. The microclimate differs little from surrounding upland. Fire will both start and carry well in the riparian stands. These stands have low resistance to change from fire and wind and snow damage. Yet their closed canopy, single-storied structure is quick to regenerate.

These stands most frequently surround seasonal streams. During the season of flow, stream temperatures are cool as a result of the closed canopy. Stem density can be very high and subsequent root strength combined with less water leads to generally stable banks. Ground cover is usually low, leading to more surface erosion than conifer riparian stands.

Hardwood riparian stands are generally similar to their upland surroundings, making them valuable watering sites for local wildlife. They are less important for thermal cover and migration corridors than coniferous riparian stands. Their acorn crop makes them important foraging areas for mast-dependent wildlife.

The economic value of the hardwoods is much lower than conifers, so far less timber harvest has occurred in these riparian areas. As a result, restoration opportunities in this riparian type are few.

Meadow Riparian

The majority of meadow riparian areas are open canopy areas. As a result, these types of riparian areas receive high amounts of solar radiation, have high diurnal temperature fluctuations, little microclimate differences, and a narrow range of influence beyond the active channel. Fire will start and carry very rapidly through meadow riparian areas. They are dependent upon frequent fire for maintaining their open canopy characteristics.

Stream channels tend to be along the margins of the meadows and are either seasonal creeks or perennial seeps or boggy areas. Light vegetative covering makes easily destabilized banks prone to downcutting and headwall erosion. Water temperatures show a strong diurnal fluctuation, similar to air temperatures. On-site diversity in these areas is low, yet may include highly specialized or unique species. Downstream aquatic diversity is increased because of the different types of production occurring at these sites.

Meadows provide a horizontal migration route. Riparian areas on their margins provide important water sites for the meadow-dependent species, but do not function as important migration corridors themselves. However, their location along the edge of the forest/meadow ecotone increases the on-site diversity of terrestrial species.

Ultramafic Riparian

At these sites high levels of magnesium relative to calcium, high levels of nickel and chromium, and low levels of available soil water limit plant species to those tolerant of these conditions. Ultramafic riparian areas support a high diversity of specialized plants, with many species being endemic or sensitive.

Most stands have an open to moderately closed canopy (20 to 70 percent). Understory vegetation cover varies from open to dense. Therefore, seasonal and diurnal temperatures fluctuate more than in other riparian stands. Ultramafic riparian stands provide a cooler, contrasting microclimate to the harsh upland ultramafic areas often dominated by open Jeffrey pine stands.

Port-Orford-cedar is often the primary overstory component in riparian areas. Port-Orford-cedar grows slowly on these sites, generally reaching 30 inches in diameter in 400 years on seasonal streams and 30 inches in 200 to 300 years in perennial wet sites. It will remain standing long after it dies. While Port-Orford-cedar has a slow decomposition rate, the sparse vegetative cover on ultramafics creates a low fuel load. This, in turn, results in low intensity fires when fire occurs.

Phytophthora lateralis is an introduced pathogen that kills Port-Orford-cedar, reducing shade and concentrating the delivery of large wood. Mortality rates in well-established disease sites are generally higher in the flat, wet sites and lower on steeper stream sections where spores cannot catch on to roots as easily. The rate at which Port-Orford-cedar dies from the introduced root disease could likely cause the population size to fall outside the range of natural variability.

Ultramafic rocks weather to produce landforms with unique topography and hydrology, often prone to mass wasting and erosion in areas with heavy precipitation. The highly sheared structure and low water permeability of the ultramafic rocks result in frequent springs and bogs, flashy flows, inner gorge landslides, and highly erodible stream channels which are sensitive to ground disturbance. The interaction of stream flow with large boulders and resistant outcrops can result in a diverse channel morphology. Because ultramafic riparian areas have fewer trees than conifer or hardwood riparian, there is less large wood providing structure in the stream channel. However, when large Port-Orford-cedar is delivered to the channel, it decomposes slowly and functions as structure for a longer period of time than a similar piece of Douglas-fir. Because of the open canopy, stream temperatures are usually much warmer than in streams bordered by dense conifer or hardwood forest. The soil chemistry results in higher pH water than in streams which flow through other soil types.

Although plant diversity is high, terrestrial vertebrate diversity and abundance is low. This is a result of the low thermal cover and low availability of forage. Most use by terrestrial vertebrates is seasonal. Riparian areas are important both as water sources and as travel corridors.

Restoration in sparsely vegetated ultramafic areas have had limited success. Development of disease-resistant Port-Orford-cedar and five-needle pine species could improve the success of regeneration in ultramafic riparian areas.

Information Needs: There is a need to conduct site-specific analysis and surveys to support management activities within Riparian Reserves, as described in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (ROD, 1994). There is a need to determine whether previous riparian buffers were effective in protecting riparian processes.

Management Opportunities: There is an opportunity to implement management activities within Riparian Reserves which preserve the critical riparian processes, and meet the objectives of the Aquatic Conservation Strategy. Where site-specific analysis determines that the critical riparian processes described above can be met, Riparian Reserve boundaries could be adjusted in accordance with the ROD pages B-13 and C-31. Restore riparian processes where they are not properly functioning.

Specifically:

Meadows have been encroached upon by conifers due to the exclusion of fire. Riparian ecosystem processes that have been described above should be maintained during restoration efforts.

Riparian thinning and/or planting in existing managed stands is a possible management opportunity. Apply silvicultural practices for these riparian areas to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

TERRESTRIAL ECOSYSTEM NARRATIVE

Vegetative Characterization

The Lobster Creek watershed contains a diverse assortment of plant communities and vegetation types. This diversity is due to the location of the watershed in a transition zone between the coastal face and the drier, inland Siskiyou habitats. In addition, the watershed has a wide variation in aspect, slope and soil types.

Most of the watershed is vegetated by Douglas-fir forest with hardwoods and brush in the understory. Douglas-fir is the primary component of the Late-Successional Reserve that occupies over half of the National Forest portion of the watershed.

Ultramafic soils in the northeast portion of the watershed support a variety of conifers, including Jeffrey pine, western white pine, and incense cedar on the drier upper slopes and Port-Orford-cedar in wet areas.

Most of the land in the southern portion of the watershed has been harvested and reforested (see Managed Stand Map and Seral Stage Map). Large stands of young, even aged Douglas-fir now inhabit most of the lower portion of the watershed, interspersed with stands of alder and other hardwoods.

Approximately 450 acres of the Iron Mountain Botanical Area lie within the Lobster watershed. Common tree species in this botanical area are: western white pine (*Pinus monticola*), Douglas-fir (*Pseudotsuga menziesii*), Port-Orford-cedar (*Chamaecyparis lawsoniana*), golden chinquapin (*Chrysolepis chrysophylla)*, huckleberry oak (*Quercus vaccinifolia*) and Sadler Oak (*Quercus sadleriana*). Brewer Spruce (*Picea breweriana*) has been sighted in the northeastern portion of this watershed. Common shrub species include green manzanita (*Arctostaphylos patula*), hairy manzanita (*Arctostaphylos columbiana*), Pacific rhododendron (*Rhododendron macrophyllum*), western azalea (*Rhododendron occidentale*), coffeeberry (*Rhamnus californica*), silktassle (*Garrya elliptica*), and salal (*Gaultheria shallon*). The California pitcher-plant (*Darlingtonia californica*) can be found in large numbers in wet serpentine-peridotite areas. From the Regional Forester's list of sensitive plants, three species have been identified in this botanical area: 1) Rigid willow-herb (*Epilobium rigidum*), 2) Bolander's hawkweed (*Hieracium bolanderi)* and 3) Piper's bluegrass (*Poa piperi*). There are several plant species that are targeted for watch and review by the Regional Forester.

The northwestern portion of the Lobster Grove Botanical Area is within the Lobster watershed. There are no known sensitive plants in the botanical area, but the significance of the area lies in its old-growth plant community. This is an area of very large Douglas-fir, Port-Orford-cedar and various hardwoods.

Port-Orford-cedar grows in stands of other tree species throughout the watershed. Limited information is available on Port-Orford-cedar distribution and disease on privately owned land. On National Forest land, *Phytophthora lateralis* (Port-Orford-cedar root disease) is evident the full length of Boulder Creek, in many of the upland tributaries of the South Fork Lobster Creek, and small portions of North Fork Lobster Creek and Lost Valley Creek. Diseased and dead Port-Orford-cedar are evident in large numbers in the northeast portion of the watershed.

Wildlife Habitat Characterization

The Lobster watershed contains a large portion of the larger Northwest Coast Late-Successional Reserve (LSR). The watershed is entirely within the range of the marbled murrelet and contains 2,898 acres occupied by marbled murrelets. The late-successional habitat in the watershed provides important habitat for the American marten, pileated woodpecker and the threatened northern spotted owl, which are indicator species, meaning they represent other species which use similar habitat types. This version of the Lobster Watershed Analysis includes areas covered by PMR data, which is primarily National Forest Lands plus some overlap into private, BLM and other lands. Currently 34 percent of the 32,188 acre analyzed portion of the watershed is late-successional habitat.

Pioneer successional habitat (grass/forb/low shrub) in the watershed is found in recent (less than 15 years old) clearcut areas, meadows, open woodland areas and brushfield areas. Twenty-four percent (7,762 acres) of the analyzed portion of the watershed (32,188 acres) is currently in the grass/forb/low shrub condition. The majority of the existing clearcut areas that are functioning as grass/forb/low shrub habitat will grow out of this condition within the next ten years. The meadow habitat is being encroached by trees. Pioneer successional habitat provides habitat for black-tailed deer, Roosevelt elk and other species that utilize grass-forb, shrub and open sapling-pole plant communities.

Compared with other watersheds, a relatively large portion of the watershed is sparsely vegetated or covered with rock (483 acres or 1.5 percent). The remaining 34 percent of the watershed is in early to mid-successional habitat which typically is smaller diameter trees with closed canopy.

What is the historic and existing late-successional habitat in the watershed?

Historic levels of late-successional forest (pre-1850 to 1950) have fluctuated over time due to climatic changes and human influence (Atzet and Martin, 1991). The Regional Ecosystem Assessment Report (USDA, 1993) estimated historic levels of late-successional habitat between 45 and 75 percent for the Lower Rogue Basin. The Lobster Watershed was at the high end of this range.

Excluding ultramafic lands, about 31 percent of the portion of the Lobster watershed with PMR data is presently in late-successional forest (see Seral Stages Map). However, very little of the remaining portion of the watershed has late-successional forest. Therefore, an estimate for the entire 44,253 acres watershed is likely closer to 25 percent late-successional forest. Historical vegetation mapping shows 79 percent of the Lobster watershed provided late-successional habitat in the 1940s, prior to any timber harvest (see 1940 Vegetation Map). Burning by Native Americans and early Euroamerican settlers probably reduced what could have been late-successional habitat in 1940 to lower levels. The exact percentage or level cannot be determined.

Late-successional forests are one facet of overall biological diversity. However, late-successional forests require special consideration because their integrity as functioning ecosystems and their ability to provide habitat to species associated with the forest interior may be strongly influenced by stand size (Rosenburg and Raphael, 1986). Logging in the Pacific Northwest has reduced the size of late-successional forests, resulting in regionwide changes in wildlife species composition (Rosenberg and Raphael, 1986). On the Siskiyou National Forest much of the timber harvested has been on productive lower elevation sites. The amount of late-successional habitat on the Forest has been reduced nearly 26 percent since 1940 (USDA, 1989, Forest Plan FEIS, Chapter III-Affected Environment, page III-115).

Stands of late-successional forests are becoming isolated as harvest, fire and other activities disrupt connections between large, contiguous blocks of this habitat. This fragmentation threatens the ecological value of the remaining late-successional forests, including their value as habitat for forest interior plants and animals. The full impact of fragmentation of late-successional forests is not completely understood, but the populations and numbers of species associated with mature and late-successional forests can decrease if fragmentation, isolation, and reduction in stand size continues.

Interior forest habitat includes those portions of the late-successional forest areas that are not influenced by "edge effect." Edge effect is the result of changes in microclimate and species composition which are caused by an increased exposure to sun and wind. Edge effect penetrates a forest edge for approximately two tree lengths or about 400 feet into the forest interior, which is a guideline for the Pacific Northwest (Harris, 1984; Franklin and Forman, 1987). The preliminary results of current research (Spies et al., 1990) generally support this approximate distance.

Interior late-successional habitat was analyzed using GIS seral stages from stand level data. Interior habitat was determined by buffering in from openings in the forest. Buffering distances used were 400 feet from clearcuts or natural openings less than 40 years old. Because stands on ultramafic soils are largely open, and do not contain the same microclimates typical of closed canopy late-successional stands, these stands were not included as interior late-successional habitat. A 400 foot buffer from these stands was not applied. Some of these stands may provide typical microclimates associated with closed canopies, but an analysis of each stand was not feasible. Current interior old-growth habitat is shown on the 1995 Interior Late-Seral Habitat Map.

Table 10. Distribution of Interior Late-Successional Forest Blocks within the Lobster watershed.

	Historic (1940)		Current Condition		Future (2040)	
Block Size in Acres	**# of Blocks**	**Total Acres**	**# of Blocks**	**Total Acres**	**# of Blocks**	**Total Acres**
1-25	30	241	56	365	40	326
26-50	2	61	7	220	4	170
51-100	4	277	2	125	7	475
101-300	2	410	5	726	6	1,019
301-500	2	780	1	483	4	1,595
501-700	0	0	1	625	1	574
701-900	0	0	0	0	1	823
>900	2	9,384	0	0	1	1,757
Total Interior Acres		**11,153**		**2,544**		**6,739**

The National Forest Management Act (36 CFR 219.19) requires the maintenance of viable populations of vertebrate species well distributed throughout their current geographic range. Late-Successional Reserves have been designated to accomplish this direction for species that use this habitat type (USDA and USDI, 1994). Sixty-six percent of the National Forest portion of the watershed has been designated Late-Successional Reserve (40 percent of the entire 44,253 acre watershed) and another 13 percent of the National Forest portion of the watershed will be managed towards a late-successional habitat condition through other land allocations. The remaining 21 percent of the National Forest portion of the watershed is in matrix allocation.

The above tables show that there are currently lesser amounts of late-successional habitat in the Lobster Watershed than there were in 1940. Future projections indicate that the amount of late-successional habitat is expected to increase on federal lands, but remain low on private lands. This increase in late-successional habitat is consistent with the 1994 ROD (USDA and USDI, 1994) for federal lands (see 1940 Interior Late-Seral Habitat Map, 1995 Interior Late-Seral Habitat Map and 2040 Interior Late-Seral Habitat Map).

The ROD (USDA and USDI, 1994) further indicates that thinning or other silvicultural treatments may occur inside these Late-Successional Reserves if the treatments are beneficial to the creation and maintenance of late-successional forest conditions. Lobster is one of the highest priority watersheds for stand treatment on the Forest for marbled murrelet habitat because of currently fragmented habitat, closeness to the coast, and an excellent ability to generate large trees.

Management Opportunities: Development of late-successional structure can be accelerated through treatment of managed and natural stands in LSR and other allocations not programmed for timber harvest. Approximately 5,832 acres of managed stands in the watershed could be treated to improve habitat for the marbled murrelet and northern spotted owl. The opportunity exists to prioritize which of these stands would benefit late-successional species the most (i.e. stands within home range of owls or within potential habitat connections).

The highest priority for stand treatment to improve late-successional habitat are those stands that are in late-successional blocks. The highest priority stand for treatment identified is ATV Unit 8, which is in the center of the largest interior old-growth block. Also several managed stands have been identified as high priority for stand management (see Treatment Priority for Late Seral Development Map).

The highest priority for commercial stand treatment to improve late-successional habitat are those stands that have mid-seral habitat adjacent to existing large late-successional habitat blocks (see Figure 13, Seral Stages Map). Treatment in these stands would result in the achievement of late-successional characteristics at an earlier time than if allowed to progress at a natural rate.

What are the special and unique habitats in the watershed and how are they changing?

During the past ten years a number of important but relatively small Special Wildlife Sites (Management Area 9) on the Forest have been identified as unique wildlife habitats and small botanical sites (Siskiyou LRMP, USDA 1989, page IV-113). A total of 399 acres have been designated in the Lobster watershed (See Special Wildlife Site Areas Map). These sites constitute important components of overall wildlife habitat diversity and botanical values within the watershed.

Table 11. Special Habitat Sites (Management Area 9)

Type of Site	Number of Sites	Acres
Botanical	1	12
Dispersed Late-Successional	3	90
Elk Areas	0	
Lakes and Ponds	1	14
Meadows and Meadow Buffers	3	42
Rock Bluffs/Talus	3	65
Tanoak Areas	2	176
Wildlife Areas	0	
Total		**399**

The Siskiyou National Forest Plan designated 431 acres of Botanical areas (Management Area 4) within the Lobster watershed. This includes portions of two Botanical sites, Iron Mountain and Lobster Grove. Appendix F of the Siskiyou LRMP EIS (USDA, 1989) provides a description of these Botanical Areas.

The Southwest Oregon LSR Assessment (USDI and USDA, 1995, page 143) identified meadow and oak savanna habitat within the Late-Successional Reserves as important elements of habitat diversity. "Maintenance of these areas ensures this habitat continues to function and provide biological diversity. Though the maintenance of this habitat is contrary to late-successional conditions, the limited area, arrangement, and importance of this habitat niche does not adversely impact the objectives of the late-successional reserves, and does improve ecosystem resilience by increasing diversity".

Analysis was completed comparing historical (1940) aerial photographs with current photographs and projecting trends into the future. Meadows in the Lobster watershed are not known to have sensitive wildlife and plants, even though several other Gold Beach Ranger District watersheds do.

Meadow Conditions

Historic: Native Americans maintained meadows with burning and early settlers may have reduced conifer encroachment rates on these meadows with heavy grazing. Natural fires may have also opened many ridgetop environments to meadow, or meadow-like conditions. Since the early 1900s, when fire suppression became effective in the watershed, the meadows have increasingly become overgrown with conifer tree species.

Aerial photo analysis showed current meadows to be smaller than historic conditions. Two large meadows on private land in the lower portions of the watershed, Brushy Bald and Lobster Prairie, were expansive open grassy prairies. Steffin Meadow itself was small compared to these prairies, but many open grassy and brushy acres were located on the adjacent ridge. Lost Valley, another private meadow, was about 50 acres in size.

Current: Aerial photo analysis found that Brushy Bald and Lobster Prairie are much smaller than they were in 1940. Lost Valley and Steffin Meadow also showed evidence of encroachment by coniferous species.

Future: Meadows are projected to continue to decrease in size due to vegetative encroachment and lack of high intensity fire events, unless encroachment is reduced through manual methods (girdling, and cutting trees) and through buning.

Other Special Wildlife Sites

Existing lakes, ponds, springs, talus areas, and rock outcrops with associated caves and cliffs are not expected to have changed from historic (1940) conditions. No further analysis of these habitat components will be completed. Wildlife associated with these habitats include red-legged frog, southern torrent salamander and western toad (lakes, ponds, springs), Del Norte salamander (talus habitat), peregrine falcon, common raven, golden eagle, cliff swallow (cliff habitat), western fence lizard, sagebrush lizard, ringtail, porcupine, and marten (rock outcrops), and bats, bear, bobcat, cougar, and woodrat (cave habitat).

Information Needs: Inventories of the meadows and oak savanna areas need to be completed to determine species composition, amount of encroachment, the best methods to restore the meadow/savanna habitat, and the best methods to improve or restore native grasses and other species. Potential special and unique sites need to be surveyed to determine if they meet Management Area 9 (Special Wildlife Site) criteria.

Management Opportunities: There is an opportunity to return meadows to historic conditions. Returning to 1940 size would be a reasonable goal because there are accurate records of 1940 meadow conditions (aerial photographs) and the natural disturbance regime which maintains these sites since 1940 has been halted through fire prevention.
Some specific projects on federal lands include:

Steffin Meadow - This meadow has been encroached by Douglas-fir and incense cedar. Desirable activities include meadow slashing and burning to return the meadow to its former size.

What is the relative abundance and distribution of the species of concern in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

Proposed endangered, threatened and sensitive (PETS) species

The Siskiyou National Forest has four species listed as *endangered* or *threatened* under the Endangered Species Act: the (1) peregrine falcon, (2) bald eagle, (3) northern spotted owl, and (4) marbled murrelet. Peregrine falcons, which are classified as endangered, have been reported in the watershed but no nest sites are known. Bald eagles have been sighted along Lobster Creek and nest approximately 3 miles outside the watershed boundary. There are no areas of high use and no nest sites are known or suspected in the watershed. Marbled murrelets, which are classified as threatened, are known to occupy 2,898 acres in the watershed. The Lobster watershed contains the median home range (1.3-mile radius around a nest or activity center) of six spotted owl pairs. Of the six pairs, four have been verified to be active in the past three years, and the other two have not been surveyed.

The ROD designated 20,994 acres (47 percent) of the watershed to be managed towards a late-successional habitat condition (Management Areas 1 to 8 and 11). Additionally, 813 acres formerly classified as Matrix and Riparian Reserve have been reclassified as Late-Successional Reserve because they are occupied by marbled murrelets (USDA and USDI, 1994, page C-10). All occupied marbled murrelet habitat is protected under a Late-Successional Reserve. Therefore, the viability of murrelets within the Lobster watershed should remain stable. The Late-Successional Reserve in Lobster watershed contains the activity centers of the 6 owl pairs in the watershed. The viability of owls should remain stable. See indicator species section below.

There will continue to be little contribution to the viability of bald eagles and peregrine falcons from the Lobster watershed.

Sensitive Species

Plants: Two species of sensitive plants are known in the watershed, *Arctostaphylos hispidula* (a type of manzanita) and *Hieraceum bolanderi* (Bolander's hawkweed). These are found in areas with soils influenced by serpentinites in the northeastern portion of the watershed.

Amphibians and Mammals: Del Norte salamanders and red-legged frogs are documented in the watershed. Riparian areas in the watershed provide potential habitat for white-footed voles. There are no known Townsend's big-eared bats in the watershed. There is suitable pond turtle habitat in the watershed, but none have been documented. Wolverine have not been sighted in the area, and due to its heavily roaded and fragmented nature, low elevation, and closeness to the coast, none are expected. None have been detected on snow track surveys.

Neotropical Migratory Birds: The few large, relatively unfragmented blocks of habitat remaining within the Lobster watershed provide good nesting sites for birds, such as the pacific-slope flycatcher and hermit warbler, that are vulnerable to parasitism by brown-headed cowbirds. Cowbirds, edge specialists, are known to exist in the lower Lobster watershed, but not in the upper portions of the watershed (largely National Forest lands). Cowbirds are also particularly attracted to human habitation and cattle, neither of which occur in the watershed.

Indicator Species

Seven forest wildlife species, and one group, have been selected as management indicator species. An indicator species represents all other wildlife which utilize the same habitat type. Indicator species act as barometers for the health of various habitats (Siskiyou LRMP IV-10, USDA, 1989).

Bald Eagle and Osprey

Bald Eagle and Osprey utilize habitat corridors along major rivers, sometimes nesting up to one mile (occasionally further) from rivers in large green trees or dead trees. Existing bald eagle and osprey sighting data in the Lobster watershed was reviewed and there are no nests located in the watershed. As a result, the contribution of the Lobster watershed to the viability of bald eagle and osprey is determined to be insignificant. There is a large amount of riparian habitat which is protected under riparian reserve designation that provides habitat for riparian dependent species such as yellow warbler and white-footed vole.

Spotted Owl, Pileated Woodpecker, and American (Pine) Marten

The northern spotted owl represents over 150 other wildlife species which use late-successional forest habitat for all or part of their life cycles (Guenther and Kucera, 1978, Brown, 1985). Spotted owls are strongly associated with dense mature and old-growth Douglas-fir forests. These habitats provide the structural characteristics required by the owls for food, cover, nest sites, and protection from weather and predation. Pileated woodpeckers and pine marten represent the composite needs of over 160 wildlife species which utilize mature forest (Guenther and Kucera, 1978, Brown, 1985). The Siskiyou LRMP had designated areas for the pileated woodpecker and pine marten within Lobster (Management Area 8, Forest Plan, Chapter IV-Forest Management Direction, page IV-105). However, the ROD amended MA-8, and created Late-Successional Reserves which account for these species and the species they represent.

Existing sighting data from the Wildlife Observation (WILDOBS) database was analyzed. The geographical information system (GIS) was used to analyze stand level vegetation data to calculate historical, existing, and future levels of habitat for these species (Table12). Mature and old-growth seral stages were used for pileated woodpecker and marten habitat. For the spotted owl analysis, mature and old-growth seral stages on ultramafic soil types were not included.

Table 12. Habitat Trends for Selected Indicator Species

Year	Spotted Owl Habitat		Pileated Woodpecker/Marten Habitat	
	Acres	Percent Watershed	Acres	Percent Watershed
1940	32,224	73	34,684	79
1993*	9,900	31	10,969	34
2040	11,179	35	12,653	39

* The 1993 analysis for version 1.0 of this watershed analysis only includes the PMR portion of the watershed while the 1940 analysis includes the entire watershed. Very few acres of the watershed not included in the 1993 analysis are currently mature and old-growth habitat. Therefore, if the entire watershed were included in the 1993 analysis, overall percentages would likely be significantly less. Spotted owls have been documented in Lobster watershed (see PETS section for more details). Both pileated woodpeckers and marten have been documented in the Lobster watershed. The future in the Lobster watershed looks bright for these indicator species and the species they represent as habitat continues to increase.

Woodpeckers: The composite snag needs of woodpeckers represent all wildlife species that use cavities for nesting or denning (Siskiyou LRMP FEIS, pages III-104, III-105, USDA, 1989). On the Forest, and most likely in Lobster, there are over 75 species which use snag habitat (Guenther and Kucera, 1978, Brown, 1985). Siskiyou Forest Standard and Guideline 4-13a states that habitat capability of woodpeckers should be continually maintained in areas managed for timber production at not less than 60 percent of potential population levels.

Woodpeckers are dependent upon snags and down wood for roosting, nesting, and foraging habitat. High intensity fires killed large conifers and hardwoods. The variation in amounts left after fires is not known. There were areas shown on 1940 aerial photos, where large brushfields did not contain visible large snags. These were mainly found in areas that likely had frequent fires, i.e. placed high up on ridges on south facing slopes. Smaller snags were created in stand development where competition between densely spaced trees and brush caused mortality.

A snag analysis was completed on the National Forest portion of the watershed. Snag habitat should be managed at the 60 percent habitat capability level (Siskiyou LRMP, page IV-34). Snag analysis was completed following techniques outlined in Dillingham, Webb, and Austin, 1990 and Dillingham, 1992. Much of the private portion of the watershed has very few snags. Table 13 shows the results of the snag analysis by WAAs. Two WAAs, 20N05W and 20S02W, are currently below the 60 percent woodpecker habitat capability. Future projects in these WAAs will need to consider snag densities.

Table 13. Snag Habitat Capability

Subwatershed	WAA #	Percent Habitat Capability
North Fork Lobster	20N01F	66
	20N02W	85
	20N03W	72
	20N04W	69
	20N05W	50
	20N06W	85
	20N07F	86
South Fork Lobster	20S01F	69
	20S02W	41
	20S03W	72
	20S04W	78
	20S05W	87
	20S06W	75
	20S07W	70
	20S08W	64
	20S09F	77
	20L10W	69

Deer and Elk: Elk and deer use all successional stages to meet their habitat needs for cover, forage, and reproduction. Natural or created openings provide the majority of the feeding habitat, which is assumed to be the most restrictive habitat component in this region (Forest Plan FEIS, Chapter III-Affected Environment pages III-106 through III-107). Elk and deer represent more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Guenther and Kucera, 1978 and Brown, 1985).

Optimal cover modifies ambient climate, allows escape from human harassment, and provides forage. Thermal cover functions similarly to optimal cover, but it does not provide forage. Hiding cover allows elk to escape human disturbances (Wisdom et. al., 1986). The quality of forage is as important as the amount of forage available. Human disturbance allowed by motor vehicle access reduces elk use of habitat adjacent to roads (Wisdom et. al., 1986).

Elk use is concentrated on the lower portions of the Lobster Watershed. The elk mostly use recent clearcuts on private lands to forage in. Occasional small herds use National Forest portions of the watershed around Lake of the Woods and adjacent to private clearcut areas. Forage habitat consists of recent clearcuts on private and National Forest lands, and permanent meadow areas.

Deer are found throughout the watershed, though an accurate estimate of their population is unavailable. Local residents report that populations are far smaller now than they were ten to twenty years ago. Deer use newly harvested areas and natural meadows for foraging. They also feed on acorns from oak trees throughout the area and use the riparian areas during fawning season and summer.

To estimate the amount of deer and elk habitat, the amount and quality of forage and cover was analyzed. GIS was used to analyze seral stages at the stand level. Tables 14 to 16 lists the acres of each type of habitat estimated for the Lobster watershed.

Table 14. Historic Elk Habitat Type (1940)

Habitat Type	Percent of Watershed
Optimal/Thermal Cover	82
Hiding Cover	15
Forage	2

Table 15. Current Elk Habitat Type (1995)

Habitat Type	Percent of Watershed
Optimal/Thermal Cover	34
Hiding Cover	41
Forage	24

Table 16. Future Elk Habitat Type (2040)

Habitat Type	Percent of Watershed
Optimal/Thermal Cover	43
Hiding Cover	54
Forage	2

Existing conditions for elk habitat was evaluated using a model developed for use in Western Oregon. The model was based on the interactions of four variables: (1) size and spacing of forage and cover, (2) road density, (3) cover quality, and (4) forage quality (Wisdom et. al., 1986). Optimal cover modifies ambient climate, allows escape from human harassment, and provides forage. Thermal cover functions similarly to optimal cover, but it does not provide forage. Hiding cover allows elk to escape human disturbances (Wisdom et. al., 1986). The quality of forage is as important as the amount of forage available. Human disturbance allowed by motor vehicle access reduces elk use of habitat adjacent to roads (Wisdom et. al., 1986).

Currently the Lobster Watershed meets LRMP 4-11 which requires that 20 percent of the watershed should be maintained in forage areas. Most watersheds on the Gold Beach Ranger District do not have this much forage. The forage areas in Lobster are concentrated in the lower portion of the watershed on private land, and consequently that is where the large healthy elk herds are. As a requirement under NFMA, 219.19, the Siskiyou National Forest, Forest Plan FEIS, page III-102, designated elk and deer as indicator species in the Siskiyou National Forest, Forest Plan FEIS. Deer and elk were selected because they are commonly hunted and they represent other species that utilize early successional forest. There are more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Brown, 1985). NFMA, 219.19 states, "In order to insure that viable populations will be maintained, habitat must be provided to support, at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." Because the percentage of forage acres is projected to decline (Table 16), populations of wildlife species that are associated with this habitat type will decline on National Forest lands.

Information Needs: Pacific Meridian Research (PMR) vegetation data needs to be ground verified to ensure validity. The correlation between certain vegetation types, seral stages and wildlife use of those habitats needs to be verified. This can be completed by continuing to do surveys for presence of indicator and PETS species. There is a need to determine where road density could be reduced in order to improve elk habitat.

Management Opportunities: Woodpecker habitat can be improved by managing for snags. Existing snags in the watershed, except those that are hazardous along roads, should be retained where possible. Protect snag Port-Orford-cedar during management activities and create snags where needed to meet the Siskiyou LRMP as amended by the ROD. WAAs 20N05W and 20S02W are currently below 60 percent woodpecker habitat capability. Future projects in these WAAs will need to consider snag densities.

Forage seeding could be used where timber harvest occurs to enhance the forage value for elk. Roads could be closed to motorized travel to improve the road density value for elk. Encroaching trees in open meadows and oak savanna areas can be cut and removed or girdled (See Special Wildlife Site Section). Open meadows and oak savanna areas can be burned to remove encroachment and benefit native species. Areas of exposed soil can be seeded with native species. A potential specific project is to create some quality forage/early successional habitat within immature and mature stands by thinning to a wide spacing, creating 1 to 2 acre openings, underburning, and seeding with native species.

What are the locations and risk of spread for noxious weeds in the watershed?

Gorse, Scotch broom, and French broom have invaded the watershed and are increasing in numbers (See Noxious Weed Sites Map). Their aggressive nature threatens to destroy native plant communities. Many colonies have been discovered and destroyed, but many of these sites are still active, because seeds left from mature plants germinate after the site has been treated. New colonies of these species are expected to continue to be found as seed is carried into the watershed from neighboring lands, especially from the Elk River and Rogue River corridors. The proximity to high concentrations of weeds in neighboring areas is one of the reasons why there is such a high number of gorse and broom sites in this watershed.

Yellow star thistle, pampas grass, tansy, and Italian thistle have been found in neighboring watersheds but have not yet been observed in the Lobster Creek watershed. Their numbers in neighboring watersheds have not yet been great enough to spread seeds to the Lobster Creek area. There is a danger that equipment from sites out of the local area could bring propagules to this watershed.

Canada thistle, bull thistle, and tansy ragwort commonly occur in disturbed sites. They pose a lesser threat to the area because they have long occupied many of the watershed's disturbed sites. Biological controls, including a flea beetle and the cinnabar moth, have been introduced to reduce the number of tansy plants in the watershed.

Management Opportunities: It is especially important to control the brooms and gorse because they are just beginning to expand into the watershed and could potentially occupy much greater areas than they do now. It is also important to quickly treat any new colonies of new noxious weeds such as Yellow Star Thistle if they appear in the watershed, in order to prevent them from becoming well established.

Treatment of infected areas is needed to reduce, control and/or eliminate the further spread of noxious weeds in the watershed. It will be necessary to survey disturbed areas to detect new populations of noxious weeds before they become well established. Treatment opportunities include cutting, pulling, or burning noxious weeds, introducing biological controls, closing roads, cleaning construction machinery before moving onto National Forest lands and before leaving infested sites, using only "clean" fill material, and using only certified weed-free hay. Seeding disturbed areas with native plant species will reduce opportunities for weeds to become established, and biological controls may be necessary to control widely distributed weed populations. Follow-up surveys of treated sites will be necessary to detect noxious weed population regeneration. Before ripping roads in contaminated areas, it should be determined if doing so would encourage noxious weeds to take over disturbed sites.

What are the locations and risk of spread of Phytophthora lateralis (Port-Orford-cedar root disease) in the watershed?

Role of Port-Orford-cedar in the watershed

Port-Orford-cedar is an important component of the Lobster Creek ecosystem. It occurs throughout most of the watershed, primarily within riparian areas. Of the 26,855 acres of National Forest within this watershed, approximately 9,958 acres (37 percent) contain some Port-Orford-cedar (see Port-Orford-cedar map).

The natural range of Port-Orford-cedar (*Chamaecyparis lawsoniana*) is limited to northwestern California and southwestern Oregon but is found on many geologic zones and soil types, ranging from skeletal to productive soils. It is often the dominant tree in ultramafic riparian areas and frequently codominant with Douglas-fir in riparian areas of other geologic types. Crown closure by the species ranges from 0 to over 40 percent. Generally, however, throughout most of its range, it is restricted to areas with consistent water seepage within a meter of the soil surface. Port-Orford-cedar is valuable both ecologically and economically.

Port-Orford-cedar provides shade, large wood, and vegetative diversity on riparian and upland sites. It is fairly tolerant of shade and competition in natural stands, and can occur as a pioneer, late seral or climax species within the same stand. Growth is usually slower than Douglas-fir except in ultramafic substrates. Frequently, in mixed species stands, other species will grow taller and out compete them within 25 years of establishment. However, Port-Orford-cedar retains the ability to respond after dominants die.

In old stands, Port-Orford-cedar seems as tolerant of fire as Douglas-fir. Older trees develop thick bark and survive large, deep, fire scars. The wood has a high resistance to decay and insects. It can be especially valuable as large wood in riparian areas, remaining in streams longer than equal-sized logs of associated species. It can also have lesser value for cavity-nesters due to its decay resistance. If utilized, cavity-nesters seem to prefer dead Port-Orford-cedar over green.

Port-Orford-cedar timber brings higher prices than almost any other conifer in the United States due to log export to Japan. It is the only species than can be exported from federal lands within the Pacific Northwest. Its domestic price as lumber, however, is low to moderate when compared to the price of cedar species such as western red cedar or incense. Port-Orford-cedar boughs are used commercially for floral arrangements and have been collected along the road system in the watershed.

Effects of Port-Orford-cedar root disease (*Phytophthora lateralis*) on the watershed

Around 1952, an exotic root disease fungus or water mold, *Phytophthora lateralis,* was introduced into the Pacific Northwest from an unknown source. Both Port-Orford-cedar and Pacific yew (*Taxus brevifolia*) are susceptible to this disease, but yew are not readily killed.

This root disease lives within infected roots and wet soils. It can be spread either by infectious "swimming" zoospores or thick-walled "resting" spores. These spores can be transported via water, infected soil or woody debris, or locally by root to root grafting. The *infectious* spore (zoospore) is only formed in water or when soils are saturated. They are capable of moving a few millimeters through water or saturated soils to reach a fine root of a host tree by use of their small tail. This microscopic movement is directionally triggered by a chemical attraction to Port-Orford-cedar.

These zoospores attach to the live, fine roots (less than 1 mm in diameter) of Port-Orford-cedar that are normally abundant near the soil/water interface. After they are attached, they extend hyphae and grow throughout the root system and phloem up to the root collar of the tree.. These hyphae give off enzymes that break down the cells of the cambium of the tree. Once introduced into the cambium of the tree, this disease will grow until the entire root system is colonized and the tree dies from desiccation generally in the spring or summer.

During adverse conditions such as dry weather, the fungus produces thick-walled resting spores. These spores are the principal fungal forms in mud, and enable longevity of the fungus by providing a mechanism for surviving inhospitable conditions. Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores. Limited data indicates that infected soil can contain viable spores for approximately three years after the last host tree has died. Host tissue killed by this disease can also harbor thick-walled resting spores that can survive for up to approximately seven years while the Port-Orford-cedar host material decays. Under favorable conditions (saturated soils, cool soil temperatures, etc.) these resting spores produce the infectious zoospores.

A single introduction of the root disease into a waterway occupied by host trees can result in the spread of this disease to any adjacent, downstream, riparian area via water movement. However, the uphill distribution of this disease is slow because without an outside vector (carrier), this disease can only spread by root to root contact between infected and uninfected host trees. Discontinuity of host tree root systems is a barrier to its uphill spread.

Since 1952, this disease has been spreading throughout the range of Port-Orford-cedar primarily by the movement of infected plant materials or contaminated water or soil spread by gravity, equipment, vehicles, humans, or domestic and wild animals. The potential for loss of all Port-Orford-cedar stands to this root disease is low because of the existence of numerous protected populations representing both the environmental extremes and the middle of the species range. Currently, however, there is no identified genetic resistance or established chemical control for this disease. Prevention seems to be the most effective control strategy.

This disease appears to have infected most of the National Forest lands containing Port-Orford-cedar within the Lobster Creek watershed. However, much of the southwestern portion of the watershed is privately owned. Little to no information exists on the location and extent of this root disease on these private lands.

The portions of the National Forest system lands within the watershed that currently appear to be uninfected by Port-Orford-cedar root disease are primarily in the following areas: a few tributaries northwest of the North Fork of Lobster Creek; a portion of Lost Valley Creek; a tributary south of the

South Fork of Lobster Creek, and isolated tributaries or portions of tributaries within generally infected areas. (see Port-Orford-cedar Map).

Generally, areas within 200 feet either side of a streamcourse contain the highest concentrations of Port-Orford-cedar. Upslope areas usually have lower concentrations of this species. Port-Orford-cedar areas below roads are in greatest risk of becoming infected. Of the 9,958 acres of this watershed that contain Port-Orford-cedar, approximately 2,812 acres (28 percent) are below an existing road system and within 200 feet of an uninfected stream.

Risk of disease spread

There are several management allocations within the National Forest (see Table 2). Management areas such as LSR that have fewer or less intensive management activities are less at risk than areas such as Matrix allocations which tend to have more frequent or intensive management activities, unless high human or wildlife use occurs within the LSR.

In general, areas at greatest risk for infection by *Phytophthora lateralis* root disease are Port-Orford-cedar or Pacific yew stands that have the greatest number of the following characteristics:

- associated with riparian areas and perennial water,
- experience frequent or intensive land management activities,
- experience frequent activities within or adjacent to riparian areas,
- have high road densities and vehicle use,
- are near native surface roads,
- have high use by people or migrating animal species,
- have high wet weather use,
- are located downslope of or accessed through active, root disease, infection areas,
- have high and continuous density of susceptible species,
- are downstream of active, root disease, infection areas.

The primary vectors for spread of this root disease have been infected Port-Orford-cedar plant materials, human transmission (such as root disease spores being introduced via the mud on vehicles, equipment, tools or boots), or animal transmission (such as hooves of horses, cattle or migrating wild animals such as elk). The greater the potential for one of these vectors to move from an infected area to an uninfected area with these spores, the greater the risk of infecting an uninfected area. The spread of this root disease, therefore, is a function of the number of vectors, the risk that the vector has picked up spores, the proximity of the infected area to an uninfected area, and the likelihood that a vector will move from an infected area into an uninfected area.

Most future risk is probably associated with spore introduction via either unwashed heavy equipment or general vehicle traffic during the wet season. General traffic can spread this disease over long distances. Mud has been observed to stay on vehicles for trips over 30 miles, including trips of 15 miles on four-wheel drive roads (Forbes, 1993). Some additional risk is associated with activities such as hiking, horseback or mountain bike riding, hunting, collecting special forest products such as mushrooms, beargrass, Christmas trees, and animal migration. Many of these activities occur primarily during the fall wet season when the risk of spread is high.

Sanitation treatments (i.e. killing or cutting Port-Orford-cedar trees) and seasonal or year-around road closure can be effective in maintaining uninfected Port-Orford-cedar populations or limiting the spread of this disease. Year-around road closures within infected or uninfected areas and sanitation of stands containing Port-Orford-cedar adjacent to roadsides have been implemented within this watershed. Dry season operation, aggregate surfacing of some roads, use of uninfected water and earth, and pre-operation washing of vehicles and equipment have also been implemented. These latter measures can be effective in preventing the spread of the root disease, and are the preferred project-level control measures.

Table 17. Existing Seasonal or Annual Road Closures for Port-Orford-cedar protection (see Port-Orford-cedar map).

Road Number	Road Length (Miles)	Portion of Road Closed (Approx. Miles)	Type of Closure Device	Period of Closure	Status of Closure
3237042	0.16	0.16	Earth Barrier	Annual	OK
3237090	2.12	1.25	Earth Barrier	Annual	OK
3237091	0.90	0.90	Earth Barrier	Annual	Breached
3237093	0.20	0.20	Earth Barrier	Annual	Breached
3237110	0.46	0.46	Earth Barrier	Annual	Breached
3237120	1.64	1.64	Earth Barrier	Annual	OK
3310300	0.22	0.22	Barrier/Ripped	Annual	OK
5325410	0.13	0.13	Guardrail	Annual	OK
5502223	2.44	0.25	Earth/log Barrier	Annual	OK
Total	**10.08**	**5.21**			

In addition, sanitation of Port-Orford-cedar has occurred adjacent to the following roads (see Port-Orford-cedar map).

- Road 5502 (small area near Toast Camp)
- Road 3237110
- Road 3237090 (from Road 3237 to Road 3237091 road)
- Road 3237 (from Road 3310 almost to Road 3237020) and (small area near Road 3237120 junction)
- Road 3310 (from Road 3310230 to Road 3340110)
- Road 5325 (from Road 5325650 nearly to Road 5325330)
- Road 3340 (near 140 junction to Road 3340118)
- Road 3340190

Information needs: The primary uninfected tributaries need to be monitored for disease on a periodic basis. Mapping of both Port-Orford-cedar and Port-Orford-cedar root disease needs to be updated annually. The effectiveness of pre-operation washing, sanitation and road closure as control measures (coordinate with Southwest Oregon area pathologist), or of fire as an eradication measure needs to be periodically monitored. Determine if there are genetically resistant Port-Orford-cedar varieties, and if so plant genetically resistant seedlings.

Management opportunities: Sanitation, seasonal and year-around closures need to be continued to protect uninfected Port-Orford-cedar populations. Equipment needs to be cleaned before operations and use needs to be restricted to the dry season. See General Management Requirements, page 43.

The following table shows roads which are potential candidates for seasonal or annual closure in order to protect Port-Orford-cedar, based on mapped data. They need field evaluation to determine actual risk. The proposed period of closure, seasonal or annual, will be determined through the interdisciplinary process (see Port-Orford-cedar Road Map).

Table 18. Potential Candidates for Seasonal or Annual Closure to Protect Port-Orford cedar. (Roads are listed in order of priority Highest to Lowest)

Road Number	Road Length (miles)	Closure Objective (Prevent Import or Export)*	Amount of Road to Close (Approximate Miles)
5502220	5.59	I	3.5
5502229	0.29	I	all
3340156	1.87	I	0.25
3340150	1.85	I	0.2
3340190	3.30	I	0.7
3340193	0.31	I	all
3340196	1.90	I	all
5502260	3.45	I	all
3237130	2.20	I	1.0
3237136	0.35	I	all
3237132	1.35	E	all
3237134	0.20	E	all
3237133	0.37	E	all
3237135	0.57	E	all
3402190	0.58	I	all
3402194	0.18	I	all
3237040	1.88	I	1.40
3237041	1.45	E	all
3237043	0.64	I	all
3310260	0.96	I	all
5502320	2.02	I	1.0
5502300	0.84	I	all
5502323	0.08	I	all
5502322	0.09	I	all
5502268	0.18	I	all
5502265	1.36	I	all
5502266	0.14	I	all
5502227	0.42	I	all
5325330	1.62	I	all
3310290	0.59	I	all
5502230	0.84	I	all
5502223	2.44	I	1.4
5502-spur	0.70	I	all

*I - Prevent import of Port-Orford-cedar root disease
E - Prevent export of Port-Orford-cedar root disease

Table 19. Roads proposed for sanitation of Port-Orford-cedar trees within 50 feet below or 25 feet above road (see Port-Orford-cedar Road Status map)

Road Number	Length of Road (Miles)	Length of Road to Treat (Approx. Miles)
3237	7.5	1.2
3310	23.1	1.6
3340	15.8	0.7
3340150	1.8	0.2
3340152	0.4	0.4
3340153	0.04	0.04
3402	13.5	0.9
3402188	2.3	0.5
3402210	0.5	0.5
TOTAL	**64.94**	**6.04**

General Management Requirements

The following general requirements should be implemented in order to prevent the spread of *Phytophthora lateralis* (Port-Orford-cedar root disease).

- Clean equipment, vehicles, tools, boots, etc. before entering uninfected areas. Inspect for cleanliness prior to use.
- Restrict management activities to the dry season whenever practical.
- Use uninfected water for road dust abatement, fire fighting, and other water using activities, or treat infected water with Chlorox®.
- Wash vehicles and equipment with Chlorox® treated water.
- Use uninfected rock or soil whenever needed.
- Place uninfected aggregate surfacing on native-surfaced roads or small, scattered, infected road sites to reduce risk of vehicles picking up spores by driving through muddy areas.
- Plant *Phytophthora lateralis* resistant seedlings (if and when they become available).
- Plan project work so that work in uninfected areas precedes work in infected areas.
- Monitor the effectiveness of root disease prevention or control strategies.
- Permanently or seasonally close roads to prevent the spread of this root disease.
- Cut or kill Port-Orford-cedar along roadsides in order to provide a roadside buffer for areas with significant amounts of uninfected Port-Orford-cedar.

What is the fire history of the Lobster Creek watershed and what is the future role of fire in the watershed?

As with the majority of the Klamath Province, there is evidence of past fires throughout the landscape. Fires with both natural and human causes have influenced the area for thousands of years.

The topography, vegetation, and weather of the area are similar in nature to the Quosatana Watershed to the south. The lower portion and the South Fork of Lobster Creek have moderate slopes (less than 50 percent slope), while the North Fork of the watershed is steeper (greater than 50 percent slope). Mixed conifer stands, with a heavy hardwood shrub and tree component, dominate the landscape. Naturally occurring fuel loads are moderate, with relatively low rates of spread, but this fuel can burn with higher intensity and offer moderate resistance to control efforts under dryer late season conditions. Managed stands are distributed throughout the upper two thirds of the watershed, and most of the lower third has been harvested.

Because of the watershed's proximity to the ocean the area receives a marine air influence, primarily in the western two-thirds of the watershed below the 2,500 to 3,000 foot level. This prevents large scale fires from developing. The marine air is partially contained by the high ridge along the eastern flank of the watershed which forms a shear zone between the moister marine air to the west and the hotter, dryer inland air to the east. Lightning storms in the Lobster watershed are usually accompanied by moderate to heavy rainfall, which extinguishes most fires or prevents them from growing before suppression action has been taken. During the past 80 to 90 years human causes account for the vast majority of both the number of fires and the acreage burned.

Range of Conditions and Trends: From prehistoric times through the early part of this century, fires were allowed to burn unchecked. Weather and natural terrain features were the only things that affected the spread of wildfire. Up until the 1930s and 1940s most fires were simply monitored, as effective fire suppression resources and tactics did not exist. From that time forward, fire suppression capabilities have become more effective and fire suppression policies mandated that all fires would be controlled. Because of the low frequency of fire occurrence and the success of fire suppression, the majority of natural stands remaining throughout the watershed have evolved for most of the century without the opportunity for fire to have played out its natural role.

Although there is little historical evidence of natural causes of wildfire in the Lobster watershed, many stands reveal evidence of what can only be interpreted as prehistoric fire. Charring and fire scars on old-growth conifers can be found most anywhere one looks. Stand composition characteristics, particularly homogenous stands of either younger conifers or mixed hardwoods, would indicate that a stand resetting disturbance such as fire has occurred in some areas. It is known that Native Americans used fire during prehistoric times, to enhance forage for game which they hunted and to stimulate the growth of plant species used both for food and to make baskets. It is likely that open meadows along the southeast and western boundaries of the watershed were maintained in this fashion. It is also likely that Tanoak stands, whether pure or intermixed with large conifers, also received similar treatments. Early settlers also used fire for similar reasons, and to maintain grazing land for their livestock. Settlers were often irresponsible in their use of fire, causing fires to burn far outside of the desired areas; and in some cases, incendiary intentions were the motivation behind their use of fire. Although not supported by solid documentation, a major fire was said to have swept through the Southern Oregon coastal mountains in 1864.

Studies of fire records from 1914 to the present, for both the National Forest and Private lands in the watershed, indicate a very low frequency of natural fire occurrence during this period, and a very high success rate at extinguishing the ones that did occur. Prior to 1940 there were 5 lightning fires detected, which burned approximately 300 acres. One of these fires accounted for over 95 percent of the acres burned. During this same time, 24 human-caused fires burned approximately 6,800 acres. The majority of the acres burned were in the eastern and central portion of the watershed, east of Boulder Creek and Iron Creek. Several of these fires were started to maintain grazing lands in the Adams Prairie area and spread into the Lobster Creek watershed. Two other large human-caused fires burned in the Steffin Meadow area, two more in the Fall Mountain area, and three near the main ridge line between Lake of the Woods and Ophir Mountain.

Aerial photographs (circa 1940) and the panoramic photographs taken from several of the lookout points surrounding the area (circa 1934) reveal evidence of fires which are not documented in the known records. These fires do not have the appearance of landscape scale, stand resetting disturbances, but rather indicate smaller sub-watershed size fires, of lower severity for the most part, with some higher severity burns occurring on the southern aspects and along the ridge tops.

Since 1941 the acreage burned has decreased noticeably. Fourteen lightning caused fires have been detected, with all being suppressed at less than one acre each. The majority of wildfires have been human caused, with the managed stands of the area sustaining the greatest damage. Prescribed fire (slash burning) has been applied extensively to the managed stands on both ownerships. Fourteen human caused fires, primarily the result of logging operations or slash disposal, have burned a total of 1500 acres since 1941. The majority of these fires were small (fewer than 30 acres each), with the exception of a 160 acre incendiary fire on Lobster Hill and an 1100 acre logging operations fire north of Fall Mountain.

Present Day Fire Suppression: This watershed is allocated almost entirely to management areas where preplanned suppression strategies and acre objectives are set to control fires at a minimum size (Siskiyou LRMP, USDA, 1989). For Late-Successional Reserves the ROD (USDA and USDI, 1994) has set standards and guidelines which emphasize the prevention of loss due to large scale fires, particularly stand resetting disturbances. Under the ROD and the South West Oregon LSR Assessment, fire may be used for its beneficial effects to the ecosystem once a specific Fire Management Plan has been written for the area. Until then, rapid wildfire suppression will remain the operative plan for the watershed. Of five fire detection lookouts that once viewed the area, only one remains serviceable today. The Lake of the Woods Lookout views the majority of the National Forest Lands within the watershed. The site has not been staffed for the past three seasons due to a shortage of funding. The lookout is being converted to a recreational rental where the public will be able to rent the facility. The funds obtained form renting the lookout will be used to maintain it. The lookout can still be used administratively when fire danger is high or if funding levels change. The view from this site is rapidly being over grown by the surrounding vegetation, but a timber sale is being planned to improve the view.

Private land holdings, within and adjacent to the watershed, are protected by Coos Forest Protective Association. Under a reciprocal mutual aid agreement, Forest Service firefighting resources share in protecting these lands; utilizing the closest forces concept.

Management Opportunities: The view from Lake of the Woods Lookout needs to be re-established by cutting trees that are obscuring the view.

SOCIAL ASPECTS NARRATIVE

The following characterization and key questions were developed to describe the past, present and potential future human uses of the Lobster Creek watershed.

Cultural Characterization

The Lobster Creek watershed can be characterized as a dynamic landscape influenced by the principle physical and biological processes of climate, geology, and natural disturbances. For millions of years, the watershed evolved without the influence of humans. Over the last several thousand years, with the arrival of mankind, human processes have also had an important influence on the character of the watershed. Available natural resources attracted people to the area while human induced forces have shaped and influenced the watershed.

The streams, the land, and the resources available have set limits and provided opportunities for prehistoric and historic inhabitants alike. Flat, open land, preferred by humans, is limited within the watershed. Although much of the watershed appears to be uninhabitable, the resources of the Lobster Creek watershed have encouraged people to occupy and exploit this rugged terrain. In general, most human induced impacts to the watershed have occurred in recent history.

The history of human use within the Lobster Creek watershed can be reconstructed and interpreted by examining the physical remains of previous inhabitants as well as observable changes which are the results of human activities. Remains, examined in conjunction with information provided by the natural environment and historical records, can reveal patterns of human behavior and adaptation.

Although only a small number of sites have been documented within the watershed, the Lobster Creek watershed contains both prehistoric and historic sites. These sites represent some of the important cultural milestones in the local history. Prehistoric sites, mining and prospecting activities, homesteads, and early Forest Service sites can all be found within the watershed.

The prehistory and history of the watershed are treated in Stephen Beckham's Cultural Resource Overview of the Siskiyou National Forest (Beckham, 1978). Additionally, general histories of the region and fragmentary local histories exist in the form of oral histories, family journals, manuscripts and photo collections.

What were the prehistoric uses of the Lobster Creek watershed?

The archeological record attests to a continuous human occupation of southwest Oregon for at least the last eight to nine thousand years. Study of the Marial site (35CU84, Griffin, 1983) on the Rogue River provides several carbon-14 dates beginning at 8560 B.P., clearly establishing the antiquity of human life in this portion of southwest Oregon. Excavations carried out near the mouth of the Illinois River at the Tlegetlinten site (35CU59, Tisdale, 1986) unearthed materials from later ancient cultures, possibly dating from two major periods of use at 6000 and 2000 years ago. Human adaptations in southwest Oregon appear to have changed from a moderately mobile, hunting-gathering lifestyle to more sedentary, specialized economies. These changes are likely to have been influenced by the effects of population displacement and growth as a result of changing climates and environments in southwestern Oregon as well as in other areas.

Archeological research in southwest Oregon has demonstrated that occupation of the region can be broken into three general periods (Connolly, 1986) which represent migrations of different peoples with differing survival strategies utilizing different resources. The first stage in this classification (about 6,000 B.C. to

A.D. 300) represents an occupation by mobile hunting-gathering bands who are likely to have relied largely on terrestrial plant and animal resources.

A second cultural period (A.D. 900 to historic times) is known as the Siskiyou Pattern. The Siskiyou Pattern is hypothesized to represent a migration of Athabaskan speaking populations (possibly from the Columbia Plateau region) which ultimately displaced or assimilated earlier inhabitants. A riverine adaptation suggesting more reliance on fishing and fresh water resources characterizes the Siskiyou Pattern.

The final phase, the Gunther Pattern, is only slightly later in time than the Siskiyou Pattern, beginning about A.D. 300 and lasting until historic times. The Gunther Pattern represents a second migration of Athabaskan speaking people from northern California. These populations largely occupied the coastal areas and appear to have brought with them a life-style fully adapted to a marine/estuarine environment. People of this time period are likely to have occupied year-round villages and may have made use of coastal streams for gathering additional resources during parts of the year (Pullen, 1982).

The adaptive strategies for these people (those things that make up their cultural identity as evidenced in their material found in the archaeological record) indicates considerable use of the river and stream corridors and resources contained in and adjacent to them. Various tools and other artifacts not only document the site locations, but also reveal the types of resources being used and the types of technologies being performed. Adaptive strategies varied from region to region but within southwestern Oregon, the techniques of survival were shared across language and cultural identity.

Ethnographically, the Tututni are representatives of the final cultural period in southwestern Oregon. These Native American groups either inhabiting or using the general vicinity consisted of several groups each of which spoke a different dialect of the Athabaskan language and each having its own name. Collectively these Athabaskans are referred to as the Tututni or Coast Rogues.

These peoples inhabited much of southwestern Oregon from the beaches to the upland forests. They occupied the region from south of Bandon, Oregon to northern California and extending up the major watersheds like the Chetco, Pistol, Rogue and the Illinois Rivers. The bands were numerous and the locations diverse.

Another source of information on the subject is a "Map of Curry County - 1850s". This map shows the "location of the bands of the To-To-Tin Indian Tribe as reported July 10, 1854, by J.L. Parrish, Indian Agent, Port Orford District, and other historical information". This map identifies at least the lower end of the Lobster Creek watershed as being occupied by the Ma-can-o-tins (also known as the Mikonotunne) band of the Tututni, with a village located on the north side of the river near the mouth of Lobster Creek. Parrish describes their lands as spanning both sides of the Rogue River "....the fishing grounds of the Ma-can-o-tins commence up the stream about six miles. Ma-can-o-tin village is about seven miles above that of the To-To-Tins, and is on the same side of the river." (or approximately eleven miles above the river's mouth). The upland extent of the band's territory is unknown, although Parrish's map indicates that the upper portions of the watershed were occupied or used by a neighboring band of Athabaskan called the Euqua-chees. The territory of the Euqua-chees "commences from a point on the coast marked by three large rocks in the sea, called by the whites the "Three Sisters" ....and extends along the coast to a point about three miles to the south of their village, which is on a stream that bears their name (Euchre Creek). Like their neighbors, they claim the summit of the coast range as their eastern boundary." Writing of all the bands in general, Parrish describes the tribe's holdings as reaching "back from the coast indefinitely".

Parrish also attempted to compile a census of the Indians of his district. The 1854 census by Parrish reported the "Ma-can-o-tins" numbered 145 individuals with their major "chief" being Yap-see-o-we-lee, while the "Euqua-chees" numbered 102 individuals with their major "chiefs" being Ah-chess-see and Tuslul. Parrish's census probably underestimated the size of the population. It is known today that a number of smaller villages existed that were not included in his census.

The general pattern of Tututni settlement indicates that large winter villages, containing 50 to 150 individuals, were established along coastal areas, rivers and major streams. Houses constructed at village settlements were substantial. "Their houses are constructed by excavating a hole in the ground twelve to sixteen feet square and four or five feet deep inside of which puncheons or split stuff are set upright six or eight feet high. Upon the top of these boards or thatches, are places for the roof. In the gable end a round hole is made sufficiently large for the entrance of one person. The descent is made by passing down a pole upon which rude notches are cut which serve as steps. These houses are generally warm and smokey" (Parrish, 1854). Another structure within the village served as a sweathouse and lodge for men and boys. These villages served as semi-permanent habitation spots, where foods collected throughout the year could be stored for use in the winter.

The rivers and stream corridors were important resource procurement areas for these people who were dependent upon the bounty provided by the anadromous fish runs as well as other foodstuffs and materials available in the riverine environment. The indigenous peoples were also highly skilled in the construction and use of watercraft and the rivers were important transportation routes to the interior regions of their territories.

Generally, the Tututni were hunter-gatherers, subsisting on a diet consisting primarily of salmon and acorns and supplemented by a variety of game and collected food items. A seasonal round of activities was practiced which is characterized by small, dispersed hunting and gathering groups which would traverse the upland areas in search of game, plants, nuts, berries and other raw materials during spring and summer months. Temporary camps in the uplands consisted of grass covered, brush or animal hide shelters. Site SK-1110, the Fall Creek Lithic Scatter, probably represents this type of temporary camp. Fall signalled the time for communal fishing and acorn gathering and the occupation of winter villages by multi-family groups. In winter, these people would subsist largely on stored resources collected during the summer and fall.

Major ridge tops which surround the watershed were also used by the aboriginal population as trade and travel routes. Archeological sites found on these ridge tops usually indicate small temporary campsites. Historically, trails and later roads followed these aboriginal travel routes. Site SK-1102, the Mountain Wells Trail, was an Indian "trace" as identified by "Chief" Elwin Frye, a packer for the Forest Service and the descendant of early Rogue River settlers. This route was later identified as the "Military Trail" on the 1915 Siskiyou National Forest map, connecting Port Orford with Agness. Still later, the route became the Mountain Wells Trail, a National Forest administrative trail. Small segments of this trail still exist, however much of the route has been replaced by today's Forest road system.

During the 1850s, Euroamerican miners and settlers began to filter into the area mostly drawn by the lure of gold-bearing beach sands and riverine placer deposits. Differences in culture, lifestyle and economic subsistence between the native peoples and newly arrived Euroamericans inevitably led to conflicts and culminated in the Rogue River Wars. The Lobster Creek watershed was the site of a number of actions during this conflict. Violent clashes which began in the inland sections of the Rogue River valley soon spread to the coast. Outrages and retaliation by both parties soon brought the situation to a boiling point and on the night of February 22, 1856 the coastal bands swept through the pioneer settlements killing twenty-three persons and burning nearly every building they found including most of the town of Gold Beach. By March 21, the trapped survivors were rescued by the arrival of soldiers and volunteers.

A force of 112 men commanded by Captains Ord and Floyd-Jones were dispatched on a foray up the Rogue River to the principle Mikonotunne village located in a meadow near Skookumhouse Prairie, on the southeast boundary of the Lobster Creek watershed. The soldiers, reaching the village, began to burn the plank houses and stores abandoned by the Mikonotunne. However, the Indians retaliated and close combat for the village ensued. At least five of the defenders died in the fight and another three drowned while trying to escape in their canoes. Two soldiers were also wounded in the engagement. The troop's mission was deemed a great success, as it was the first to dislodge the Rogues from one of their strongholds.

Site SK-034, the Lobster Creek Battle Site (Massacre Rock), is located at the confluence of Lobster Creek and the Rogue River. This was the site of a second conflict in the Lobster Creek area. Survivors of the Gold Beach volunteers, supplemented by new recruits, were anxious to revenge their losses. On April 22, 1856 these forces travelled up the river and concealed themselves in the massive boulders at the mouth of Lobster Creek. Shortly, two canoes containing twelve men and women came down the stream. When they passed beneath the rocks, the volunteers opened fire and killed all but three of the unsuspecting people.

June of 1856 marked the sunset of the era of Native American dominance in the area. This month marked the conclusion of the Rogue River Wars. Following the wars, the remaining population of aboriginal people were removed to the Grande Rhonde and/or the Siletz reservations. Some individuals escaped relocation or were allowed to return to their homelands, mainly because of intermarriage with the white settlers. Additionally, some individuals returned to their homelands after the enactment of the Dawes Act which opened public domain allotments to Indian peoples. In 1938, twenty-three allotments were in existence in Curry County.

Glimpses of these people and their way of life have been made known to us through ethnographic information, the journals and manuscripts of the early white explorers and settlers, records and accounts from the Rogue River Wars and the archaeological record as it pertains to the Northwest Coast Culture area. The ethnographic information that exists for these people was acquired from research conducted at Siletz and Grande Rhonde reservations and the Smith River rancheria. However, by the time the interviews or ethnographic sketches were compiled in the late 1800s and the early part of this century, most sources of information were already a generation removed from tradition.

What were the historic uses of the watershed?

The historic period in this portion of southwestern Oregon begins as early as the 16th and 17th centuries with the voyages of the various navigators such as Aguilar, De Fuca, Drake, Cabrillo, Sebastian, and later, James Cook, George Vancouver and Robert Gray. The earliest recorded contact between the coastal natives and Europeans is noted in the log of Captain Robert Gray in 1792 while in the same month Captain George Vancouver met Indians off Cape Blanco.

Within the next quarter century trappers and traders, including Peter Skene Ogden, leader of the Hudson's Bay Company fur brigades, North West Company fur trader Peter Corney and an American party of trappers led by Jedidiah Smith, came to southwestern Oregon. Russian-led hunters and traders and whaling ships of various nations also had contact with the native people on this portion of the coast.

The discovery of gold in the Sierra foothills of California in 1848 led to the expansion of several mining frontiers in the American west in following years. The miners pushed further and further afield in their search for wealth, into the little known valleys and mountains of northern California and southern Oregon. The discovery of gold along the southwest Oregon coast in the early 1850s precipitated the settlement of the lower Rogue River and its surrounding environs by Euroamericans. Gold was first discovered on the coast at places like Whiskey Creek and Gold Beach, named for the gold rich, black sand deposits found there. Later, gold deposits were found in the Rogue River. Placer gold in the streams and rivers was first exploited using the simple panning technique. Few, if any, waterways escaped the inquisitive prospectors shovel and pan and some prospecting in the Lobster Creek watershed probably occurred at this time.

Several mining claims were established in the Lobster Creek watershed, some more productive than others. Prospecting and mining sites are the most common type of site within the watershed. Evidence of intensive mineral exploration can be observed in Bonanza Basin, in the headwaters of the watershed, on Ophir Mountain, and at the confluence of Boulder Creek and the South Fork of Lobster Creek. The latter location provides good examples of mining sites within the watershed. The remains of two cabins, (Sites SK-465, the Upper Old Diggins' Cabin and SK-466, the Old Diggins' Cabin) and the remains of a placer mining operation (SK-467) can be observed at the confluence of the two streams. SK-465, the Upper Old Diggins' Cabin consisted of one small partially standing log structure when documented in 1990. Presumably this structure was a cabin for habitation purposes, but could have been used for equipment storage as well. SK-466, the Old Diggins' Cabin consists of a single standing cabin in good condition. This cabin was occupied as recently as 1989 by a family working for the contemporary claim holder. SK-467, the Upper Old Diggins' Placer Mining Site is comprised of two mining ditches and stacked rock wall of mine tailings. Of the two ditches, the upper most of the two removes water from Boulder Creek and ends below SK-466, extending for nearly a mile. The lower of the two ditches is much shorter. The upper end has been buried by a small landslide near Boulder Creek and the terminus is near the tailings piles adjacent to the Upper Old Diggins' Cabin. The notes and plat from the 1933 General Land Office (GLO) survey indicate that a family was living on an unpatented placer claim in section 25 and shows the upper ditch of SK-467, but not the structures. The notes suggest that very little gold or other minerals were being produced in the Lobster Creek watershed at that time, but that earlier times had seen a larger amount of gold production.

A series of sites (SK-674 through SK-678) in the Bonanza Basin area are also examples of the mining history of the watershed. These sites include such features as mining cabins, a water tank, a sluice box and a hydraulic mining headwall. The earliest record of mining activity in Bonanza Basin is a claim discovered in 1874 by George Curry and Bill Coy along Boulder Creek. Originally known as the Curry Mine, the name was later changed to the Bonanza Placer Mine. From 1989 through 1992 the assessment work on the claim was conducted by Calvin Messerli. Other claims were soon filed in the area including the Grizzly Bear and White Elephant groups. The turn of the century saw an increased interest in placer mining according to former claim owners, Matthew Dillon Coy and Selmar Hutchins. Extraction methods used in the basin have included stream placer, ground sluicing, panning and to a limited extent, hydraulic mining.

Mining and prospecting activity has had its declines and resurgences from the end of the nineteenth century through the 1940s. However, gold production, the backbone of the areas mining economy, slipped during the 1920s. The nation's economic prosperity and the price of gold created a situation unfavorable for mining in much of the American west. With the revaluation of gold in 1934 and available cheap labor brought on by the Great Depression, mining once again bloomed in southwest Oregon, but it was not to last. In the World War II era, gold mining was virtually stopped by the War Production Board and little recovery has been made in the post war years. The remains of mining sites that are observable today are from the not too distant past.

The removal of the native inhabitants opened the area to settlement. Accompanying the miners were the areas first settlers who trickled into the area during the 1860s. Spurred on by the Donation Land Act of 1850 and its subsequent modifications, settlers flocked to southwest Oregon lured by the offer of free land. Early settlers and miners moving into the area often built their houses on the same river or stream terraces that had provided homes for the native inhabitants. Settlement in southwestern Oregon began in the mid-nineteenth century and continued into the 1950s (Beckham, 1978).

Little in the way of homesteading activity occurred within the Lobster Creek watershed. The remoteness and difficult access precluded extensive development and most people followed a subsistence oriented way of life. This lifestyle made maximum use of the available fish and game, supplemented with produce grown and animals raised on small farms. Goods and services were traded, bartered and scavenged. Cash earning activities were limited and population densities low. Mining and the sale of livestock and fish provided some income to local residents.

General Land Office (GLO) surveys of the watershed undertaken in 1881 and again in 1891 show the location of some settlers, or possibly miners cabins. "E. Masters house" is shown on the 1891 GLO plat in T.35 S., R.13 W., section 4 on the "trail from Lobster Creek to Euchre Creek". Building symbols are also noted in section 5, possibly outbuildings adjoining "E. Masters house". The 1924 Siskiyou National Forest map shows still another homestead near the mouth of Lobster Creek, labeled the "E. Miller" cabin. Neither of these two sites have been located or documented at this time.

The establishment of the Siskiyou National Forest in 1906 marked the beginning of a new era in the management of public lands in southwest Oregon. The creation of the Forest Reserve signaled an end to the assault on the public domain by timber speculators, land fraud experts, mill owners and dishonest politicians (Beckham, 1978). Henry Haefner, an early forester on the Siskiyou states that,

> *"In 1909 the National Forest area was about as the indians had left it. Nothing of importance had yet been done to improve the property or even find out what it contained in the way of timber or other natural resources."*

He also mentions the reaction of the local populace to the establishment of the National Forest,

> *"Many people were not in favor of the new order in the management of part of the public domain which the National Forest ushered in. They were not used to regulations of any kind nor did they want any. Many old prospectors believed in burning off the country to aid prospecting. Many ranchers and cattlemen did it to kill the brush and get more grass for their livestock and did not like the idea of being put in jail or paying a fine for that. The timber had little or no value, so they said. It could not be marketed as lumber because it was inaccessible, so they saw no harm in burning some of it, if it was in their way."*

Early rangers had to "establish a prestige as a fearless and vigilant forest officer..." to maintain order with these "self reliant people who asked for no odds or expected any." The early foresters' duties included mapping, estimating the amount of timber and agricultural land, law enforcement, fire protection, as well as a multitude of other jobs involved with the administration of a large timberland. The rangers often built their own stations and headquarters. Various trails, lookouts and telephone lines were constructed in the general area during the first three decades of this Forests history.

The effects of human-caused fire, as well as natural fires, have had the most dramatic effect on the watershed. The patterns of vegetation seen in the watershed today are a result of the effects of fire. By the 1930s, fire detection and prevention had attained an important position in the hierarchy of a ranger's responsibilities. The fire lookout became the backbone of the fire prevention movement. Forest Service lookouts were the most obvious symbol of the new attitude towards fire detection and prevention. The lookout not only served as the spotter of wild fires, he was often the "first line of defense" in fighting the fire he may have spotted from miles away. Forest Service lookouts are an important component of the historic fabric in the Lobster Creek basin.

The Lake of the Woods lookout is a prime example of the life and history of a typical lookout within the Lobster Creek watershed. The General Land Office survey plat of 1927 shows a "lookout crows nest" near the site of the current lookout with a "lookout cabin" (probably SK-011, the Lake O' Woods homestead) nearby. By 1933 a Plan L-4 ground cabin was erected at the location. This "L-4" cabin design allowed the lookout to live safely and comfortably during his seasonal mountaintop life. The "L-4" was a 14 by 14 foot frame cabin bundled in kits for hauling by mule train to its final destination. It could be easily erected atop four tall poles cut on site. The 1933 lookout was situated further west on the point of the mountain than the present lookout. The current Lake of the Woods Lookout was placed on this site in 1974. First located on Barklow Mountain, the R-6 flat roofed cabin, originally a ground house, was flown by helicopter to the present location and placed on an eight foot tower with catwalk. The "R-6" style lookout was introduced in 1953 and represents the final lookout style to be developed in Region 6. Employing new building materials and techniques, its flat roof was designed to alleviate the costs of re-shingling the L-4 lookout buildings. The R-6 lookout had fifteen foot by fifteen foot cabin dimensions. R-6 model lookouts were not placed on the Siskiyou National Forest in large numbers because by the mid 1960s modern fire detection and suppression methods increasingly supplanted lookout structures.

A second lookout in the Lobster Creek watershed was the Brushy Bald Lookout. According to Ray Kresek, in his publication Fire Lookouts of the Northwest, a ground house fire lookout was established by the Southwest Oregon Forest Patrol Association on Brushy Bald Mountain in 1936. The Following year this structure was replaced with a thirty foot tower with a seven foot by seven foot cabin mounted on its top. This lookout was eventually destroyed in the Columbus Day storm of 1962.

Hand-in-hand with the development of the fire prevention lookout system was the development of overland communications between the lookouts and the ranger stations. Telephone lines were the only means of long distance communication in the early days of the Forest's history. Prior to 1913 there were only 33 miles of telephone lines in the Siskiyou. In that year, an additional 123 miles of phone wire were strung. The General Land Office survey map of 1927 shows the first telephone lines in the Lobster Creek watershed. These lines connected the Agness Ranger Station with Lake of the Woods lookout and Port Orford.

Another component of the historic fabric of the watershed is the trail system. Many of these paths followed older aboriginal routes. Others were routes that the miners, and the packers that supplied them, established to get their materials to and from the prospects. Later, Forest Service administrative trails formed a web of connecting travel ways linking scattered facilities. These transportation corridors were often the first travel routes connecting Forest Service facilities with the populated coastal and river areas, as well as the coast with the Rogue Valley. During the first three decades of this National Forest's history, the trail systems were improved and expanded.

Review of the Siskiyou National Forest 1911 map shows a number of trails within the watershed. Two of the earliest of these appear to be the Military Trail (or Mountain Wells Trail) which follows the Lobster Creek/Elk River divide and connects Port Orford with the Agness/Illahe area. Another early trail follows the southeast boundary of the watershed connecting the mouth of Lobster Creek with Lake of the Woods, Brushy Mountain and the Agness/Illahe area. The general route of these trails coincides with older aboriginal routes identified by "Chief" Elwin Frye who developed a map of early Indian trails and village sites from oral interviews with his Indian relations.

The Depression of the 1930s brought an influx of people to the public forest lands. Numerous out of work individuals sought survival in the mountains undertaking a subsistence economy lifestyle. Many of these people were also engaged in prospecting and small scale mining encouraged by the revaluation of gold. The Depression Era also saw the development of the Civilian Conservation Corps (CCC), another important chapter in the history of the Pacific Northwest. Fire prevention and suppression, timber stand improvement, range improvement, soil conservation, road building and forest facilities construction were all undertaken by the CCC volunteers. The Civilian Conservation Corps provided employment for local men and a measure of financial relief for their families.

Local histories exist in the form of family journals, manuscripts and photo collections. Oral histories, often compiled later in time, are also an invaluable source of information regarding the lifeways of the early pioneers. After settlements became well established, the history of the area is better documented in the form of newspaper articles, tax, land ownership and mining records, religious, birth, death and marriage records.

Even though the historic element is by far more tangible than the prehistoric, little of the cultural fabric within the watershed is known. Little of the watershed has been surveyed for heritage resources and many of the sites in the watershed have not been formally documented or evaluated for their historic significance.

Does the watershed contain any culturally significant traditional use areas?

There is no evidence to suggest the watershed is presently used for traditional activities by local Indian groups. Recognized tribes consulted (Tolowa, Karuk, Coquille and Siletz) did not provide any additional information regarding traditional use in the watershed.

Information Needs: The complete status and number of cultural sites in the watershed are unknown. Formal site evaluations of many sites in the watershed have not been conducted.

Management Opportunities: Cultural resource surveys will precede all ground disturbing projects. All sites discovered will be documented and added to the Forest inventory. The significance of inventoried sites shall be evaluated for eligibility for the National Register of Historic Places. Suitable cultural resource properties may be interpreted for recreational use and educational benefit of the general public. There is an opportunity for partnership with the recognized tribes in the development of recreational and educational programs.

What are the major recreational uses in the watershed and where do they occur?

Historic recreational use in the Lobster watershed included swimming, fishing, hunting and horseback riding. Bark Shanty bridge was used to view the impressive fish runs up Lobster Creek. Trails went along the mainstem of Lobster Creek to access swimming and fishing holes. The mouth of Lobster Creek and the pools at Bark Shanty Bridge and Ol' Diggins were favorite locations. Trails also went to Steffin Meadow, meadows along the upper edges of the watershed, and the Lake of the Woods area for hunting. A favorite recreational mining location was at Ol' Diggins on the South Fork of Lobster Creek. Recreational mining also occurred at various other locations in the streams of the watershed (Stansell, 1998).

Road construction began on private land in the 1950s and on the National Forest in the mid-1960s. The roads were often constructed over the old trails. As the road mileage in the watershed increased, road-related recreation increased and horseback riding and trail activities decreased.

Today, the Lobster Creek watershed continues to provide many road-related recreation opportunities, primarily recreational driving, hunting and dispersed camping. The primary roads in the watershed that are open for public travel are Forest Service (FS) Roads 3310, 3340, 3237, and 3402. These roads connect to roads in other watersheds providing loop road opportunities. Highway 101 can be reached from Lobster Creek via Euchre Creek watershed and FS Road 33 (Agness-Powers Road) can be reached via the Two Mile and Foster Creek watersheds. Residents from Port Orford access the northern part of the watershed for hunting via FS Road 5325 (Elk River Road).

Although FS Roads 3310 and 3340 are single-lane paved roads, the great majority of the roads are single-lane gravel roads. These roads serve recreation, commercial timber, and administrative traffic. There can be some heavy use of these roads during weekends and hunting season. A road counter on FS Road 3310 was in operation from 1992 to 1997. In 1992, the average daily traffic (ADT) was 64 vehicles. The ADT has dropped consistently over the years, and for 1995 to 1997, it was 18 or 19 vehicles ADT. During those years, commercial traffic ranged from 3 percent to 31 percent of the use; recreational traffic ranged from 22 to 88 percent; and administrative traffic ranged from 6 to 13 percent. There were greater road-related recreational opportunities in the watershed up until approximately 10 years ago, when the roads accessing private land were closed with gates except during hunting season.

Currently, the only developed recreation facility in the watershed is the Lobster Creek Camp which is owned and operated by Curry County. This facility is on 52 acres, located approximately 1/2 mile below the confluence of Lost Valley Creek and South Fork of Lobster Creek. Access is provided by a spur road off of FS Road 3310. Groups of up to 75 to 100 people attend one and two week camps, sponsored primarily by education and church groups and civic organizations. There are two A-frame cabins containing kitchen facilities and housing for counselors, 12 smaller three-sided cabins with bunks, and restroom and shower buildings. There is a large open field where archery, volleyball and other sports take place and 3 1/2 miles of trail are maintained for hiking, biking, and horseback riding (Rush and Logsdon, 1998).

Other recreational activities in the watershed are limited. Swimming occurs at the mouth of Lobster Creek and along the lower section of the mainstem. Recreational mining occurs in the South Fork and in Boulder Creek. The only system trail in the watershed is the trailhead for the Iron Mountain trail. Special Forest Products collection can occur on public lands in the watershed.

The Forest Service Recreation Opportunity Spectrum (ROS) classification system provides a framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. These classes are arranged along a continuum ranging from Primitive to Urban. The Lobster Creek Watershed, with the exception of 2,500 acres in the North Fork of Lobster, is classified as Roaded Natural. The 2,500 acres in the North Fork is classified as Semi-Primitive Motorized (ROS, 1986). These classifications correspond to the great amount of road-related recreation opportunities in the watershed and the limited amount of unroaded recreation opportunities.

Recreation trends

Recreation trends shown in the Oregon State Comprehensive Outdoor Recreation Plan Survey (SCORP) indicate that demand for dispersed recreation use of various types is increasing. The predominant activities that households are participating in, listed in rank order, are sight-seeing/pleasure driving (69.3 percent), swimming (58.7 percent), boat fishing (40.6 percent), tent camping (39.1 percent), and nature study and wildlife viewing (38.5 percent). Demand for recreation opportunities in this watershed are expected to remain the same or gradually increase from current levels. SCORP also indicates a demand for trails is increasing. The emphasis is for accessible trails for the disabled; trails in or near or connecting to urban areas; trails that are closer to home for all users; and trails for equestrian users. There is a higher priority for trail maintenance or reconstruction over new construction (SCORP, 1994). Locally, there has been an increased interest in accessible trails; equestrian, mountain bike, and all-terrain-vehicle (ATV) trails; and day-use trails.

Another trend is declining road maintenance funds to keep roads open for public access. In addition, road closures for fish and wildlife protection, Port-Orford-cedar protection, road-related watershed restoration, meadow protection, and other resource-related purposes may lower current levels of roaded access in the watershed. Both of these trends indicate there will be fewer roads in the watershed in the future than there are now. Consequently, road-related dispersed recreation opportunities will decline or be forced to occur on the more heavily travelled main system roads.

Information Needs: Road use data on FS Road 3310 should continue to be collected, if feasible. Empirical data on recreation use and demand would be beneficial if collected. Dispersed recreation sites could be identified and recorded. Survey work to determine which roads could become trails, if the road was closed or decommissioned, should be completed. Partnership opportunities and projects should be explored.

The Lake of the Woods Lookout is currently being converted to a recreational rental facility either administered by the Forest Service or a concessionaire permitted through the Forest Service. The rental fees will be used to maintain the facility. Funding to operate this facility as a lookout has been cut in the last two years, and it is currently not being used. Rental of lookouts have been very successful on the Chetco Ranger District and other locations in the Northwest Region.

Management Opportunities: There is an opportunity to convert roads that may be closed or decommissioned in the future to trails. This could provide opportunities for use by ATV's, mountain bikes, horseback riders, or hikers.

There are opportunities for interpretation of fisheries resources, including populations, monitoring, restoration, and enhancement. Prime locations include the lower Lobster mainstem, especially where the Curry County Road 545 (North Bank Rogue River Road) crosses Lobster Creek.

Information should continue to be provided to the public on the appropriate use of the undeveloped and dispersed areas, proper disposal of garbage and waste (pack-it-out), and to prevent fishing in restricted areas.

What commodities can be produced by the watershed, within Forest Service jurisdiction?

Table 20. Managed Stand Acres By Management Area

Management Area	Acres	Acres Harvested	Percent Harvested
Late-Successional Reserve	17,846	5,284	30
Matrix	5,758	1,720	30
Supplemental Resource	1,303	196	15
Riparian Reserve	1,261	345	24
Other	1,259	7	1

Timber

The Matrix land allocation was assigned to approximately 21 percent (5,758 acres) of the watershed. The allocation of many of these acres may change from Matrix to Late-Successional Reserve following completion of marbled murrelet surveys. Approximately 1,720 acres has already had one rotation of harvest. In the young stands growing on these harvested areas, timber stand improvement has been conducted on approximately 1,050 acres.

Sixty-seven percent of the watershed is now classified as Late-Successional Reserve. Approximately 5,200 of these acres have been previously harvested. Timber stand improvement has been conducted on approximately 2,500 of the harvested acres. There is a potential for commercial thinning in the LSR, however this would only occur if it would improve late-successional habitat characteristics at an earlier date. Scattered roadside hazard trees and hardwood blowdown periodically exist and may need to be harvested for public access or safety.

Special Forest Products

Within the Matrix designation, special forest products include but are not limited to posts, poles, rails, landscape transplants, yew bark, shakes, seed cones, Christmas trees, boughs, mushrooms, fruits, berries, hardwoods, forest greens (e.g. ferns, huckleberry, salal, beargrass, Oregon grape, and mosses), and medicinal forest products. Fuelwood gathering is also permitted.

Special forest products can be collected in Late-Successional Reserve under the Forest LSR assessment objectives if their collection is consistent with the Standards and Guidelines of the Northwest Forest Plan. Fuelwood gathering is only permitted as defined on page C-16 of the Northwest Forest Plan ROD.

Management Opportunities: Young stands in Matrix areas could be silviculturally treated to optimize stand densities, diversity, and stand health. Young stands in Late-Successional Reserve could be treated to maintain stand health and enhance the development of late-successional characteristics.

Mining

The watershed has had a history of mining dating back to 1874 when the Bonanza Placer Mine was discovered and worked by George Curry and Bill Coy. Mineralization within the watershed appears to be limited to Boulder Creek. It seems likely that the source of mineralization are intrusive dikes related to the Pearse Peak diorite which is suspected of being the source of gold in the Elk River Watershed. There have been some prospects for hard rock mining in the Boulder Creek watershed, but most activity has been centered on placer deposits.

The Bonanza Placer Mine was located in Bonanza Basin, T.34S., R.12W., sections 4 and 5. According to the 1940 Metal Mines Handbook (Bulletin 14-C of the Oregon Department of Geology and Mineral Industries) the mine was worked consistently in the 1920s and 1930s with approximately 2 acres mined and a production of $150,000 by 1940. The Handbook also goes on to say that the largest nugget found on the mine site was 7 ounces.

Also within Bonanza Basin was the Bonanza Basin Placer located below the mine mentioned above. No values were reported, but there was some development of the property. A 400 foot long by 14 foot deep trench was excavated to assist in the recovery of gold. A cabin on the site remained standing until about 1995.

The Metal Mines handbook also lists the Boulder Creek Mining Co. (Star Mine) which was also known as Old Diggins, located near the confluence of Boulder Creek with the South Fork of Lobster Creek (T. 34S., R.13W., section 25). The owner of the time intended to work the property extensively with hydraulic giants during the winter of 1915-16. The company had ordered 1,000 feet of piping to connect with a ditch. Improvements included a 4,800 foot long ditch, two dams, a waterpowered sawmill, an 800 foot pipe giant, blacksmith shop and 3 cabins. None of these improvements are apparent today, although the 1940 photo flight shows a large cleared area at the location of Old Diggins.

In recent years mining claims have been maintained on these sites with individual claimants using 4 inch suction dredges. Typically current mining is recreational in nature, although some claimants state that they can make enough in gold for subsistence.

Which roads are needed for future access in the watershed and which roads need treatment to protect the resources of the watershed?

Roads on National Forest land have been classified as "primary," "secondary," or "candidate," based on an interdisciplinary evaluation of their present and future use. Roads classified as "candidate" will not be needed for long term future administrative access (See Forest Service Road List in Appendix A). The importance of these roads for access will be determined through public involvement at the time of proposed road treatment projects.

During the summer of 1998 as part of the Lobster Creek Partnership effort roads within the Lobster Creek watershed were inventoried. The inventory focused on roads upstream of the three "source areas" or critical fish production reaches identified by the Partnership, on both National Forest and John Hancock land. The objectives were to determine erosion problem areas, condition of stream crossings, and potential for stream diversions and road failures. Based on these inventories, road repairs were prioritized by WAA.

Prioritization criteria included:

- size of potential problems
- topographic location
- number of problem sites within a watershed and their potential to cumulate effects
- ability to deliver sediment to fish source area

A map of all inventoried sites on National Forest system roads and a listing of these sites and survey findings by road number and mile post are on file at the Gold Beach Ranger District.

Table 21: Watershed Analysis Area Priorities for Road Treatments

WAA	Priority
20L05F	High
20L07F	High
20L08F	High
20L09F	High
20L10W	Medium
20N01F	**Highest**
20N03W	Medium
20S01F	Medium
20S02W	High
20S03W	**Highest**
20S04W	High
20SO5W	Medium
20S08W	Medium
20S09W	Medium

When roads were prioritized for treatment, WAAs 20L07F and 20L09F were also ranked as Highest priority. Because most of the identified road problem sites within these two WAAs were repaired by the Hancock Timber Resources Group shortly after the survey was completed in 1998, these WAAs are no longer considered highest priority.

Information Needs: Complete the road inventory on National Forest land by identifying unstable road fills with the potential to deliver sediment to streams.

Management Opportunities: There is an opportunity to repair identified potential problem sites, particularly on roads in WAAs 20N01F and 20S03W, which are on National Forest lands, and are ranked as Highest priority.

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APPENDIX A

Road Classification for roads and segments of roads within the Lobster Creek Watershed

Road Number	Segment Length (Miles)	Transportation Network Analysis (TNA) Class	Culvert Treatment Priority (from Inventory)*	POC Disease Recommended Treatment**
3237	7.46	Secondary	High	Sanitize 1.2 miles
3237 unnumbered spurs	0.16	Candidate		
3237020	0.80	Candidate		
3237040	1.84	Secondary		Close 1.40 miles
3237041	1.41	Candidate		Close all
3237042	0.16	Candidate		Existing Closure
3237043	0.65	Candidate		Close all
3237046	0.20	Candidate		
3237090	2.12	Candidate		Existing Closure
3237091	1.46	Candidate		Existing Closure
3237093	0.19	Candidate		Existing Closure
3237095	0.17	Candidate		
3237110	0.42	Candidate		Existing Closure
3237115	0.38	Candidate		
3237120	1.72	Candidate		Existing Closure
3237121	0.09	Candidate	Low	
3237130	2.22	Candidate		Close 1.0 miles
3237132	1.38	Candidate	Low	Close all
3237133	0.37	Candidate		Close all
3237134	0.23	Candidate		Close all
3237135	0.35	Candidate		Close all
3237136	0.34	Candidate		Close all
3310	22.42	Secondary	High	Sanitize 1.6 miles
3310 unnumbered spurs	2.80	Candidate		
3310101	0.24	Candidate		
3310180	0.65	Secondary		
3310181	0.37	Candidate		
3310230	0.42	Candidate		
3310231	0.29	Candidate		
3310260	0.96	Candidate		Close all
3310280	0.12	Secondary		
3310290	0.59	Candidate		Close all
3310294	0.24	Candidate		

Road Number	Segment Length (Miles)	Transportation Network Analysis (TNA) Class	Culvert Treatment Priority (from Inventory)*	POC Disease Recommended Treatment**
3310300	0.22	Candidate		Existing Closure
3310390	0.94	Candidate	High	
3310395	0.26	Candidate		
3310397	0.38	Candidate		
3310420	0.12	Candidate		
3310430	0.29	Candidate		
3310435	0.67	Candidate	Low	
3340	9.62	Primary	High	Sanitize 0.7 miles
3340 unnumbered spurs	2.62	Candidate		
3340110	3.64	Secondary	Low	
3340111	0.03	Candidate		
3340115	0.47	Candidate		
3340118	1.30	Candidate		
3340120	0.22	Secondary		
3340130	0.12	Candidate		
3340135	0.27	Candidate		
3340137	0.16	Candidate		
3340140	4.38	Secondary	High	
3340141	0.21	Secondary		
3340142	0.27	Candidate		
3340144	0.34	Candidate		
3340146	0.42	Candidate		
3340147	0.07	Candidate		
3340148	0.35	Candidate		
3340150	2.17	Secondary	High	Close 0.2 miles; Sanitize 0.2 miles
3340151	0.62	Candidate		
3340152	0.36	Candidate		Sanitize all
3340155	0.36	Candidate		
3340156	1.76	Candidate	Low	Close 0.25 miles
3340157	0.27	Candidate		
3340158	0.12	Candidate		
3340170	0.06	Candidate		
3340180	0.06	Candidate		
3340190	3.30	Secondary	Medium	Close 0.7 miles
3340191	0.57	Candidate		
3340192	0.56	Candidate		
3340193	0.66	Candidate		Close 0.31 miles

Road Number	Segment Length (Miles)	Transportation Network Analysis (TNA) Class	Culvert Treatment Priority (from Inventory)*	POC Disease Recommended Treatment**
3340196	1.90	Candidate	High	Close all
3340200	0.23	Candidate		
3340201	0.27	Candidate		
3340220	0.07	Secondary		
3340221	0.25	Candidate		
3340222	0.14	Candidate		
3340226	0.52	Candidate		
3340227	0.08	Candidate		
3340230	0.70	Candidate		
3340260	1.44	Candidate		
3340265	0.36	Candidate		
3340600	0.12	Candidate		
3340605	0.10	Candidate		
3353 unnumbered spurs	0.13	Candidate		
3353370	1.95	Candidate		
3402	3.01	Primary	High	Sanitize 0.9 miles
3402 unnumbered spurs	0.16	Candidate		
3402160	1.22	Secondary		
3402161	0.09	Candidate		
3402163	0.06	Candidate		
3402164	0.25	Candidate		
3402170	0.05	Candidate		
3402180	0.03	Secondary		
3402188	1.60	Candidate		Sanitize 0.5 miles
3402190	0.61	Candidate	Low	Close all
3402194	0.17	Candidate		Close all
3402210	0.54	Secondary		Sanitize all
3402230	0.85	Candidate	Low	
3402232	0.19	Candidate		
3402234	0.15	Candidate		
3533	0.03	Primary		
3533 unnumbered spurs	0.04	Candidate		
5325	0.42	Primary	Low	
5325330	1.62	Candidate		Close all
5325410	0.13	Candidate		Existing Closure
5502	2.00	Primary		
5502 unnumbered spurs	4.85	Candidate		Close 0.9 miles
5502220	5.44	Secondary	High	Close 3.5 miles

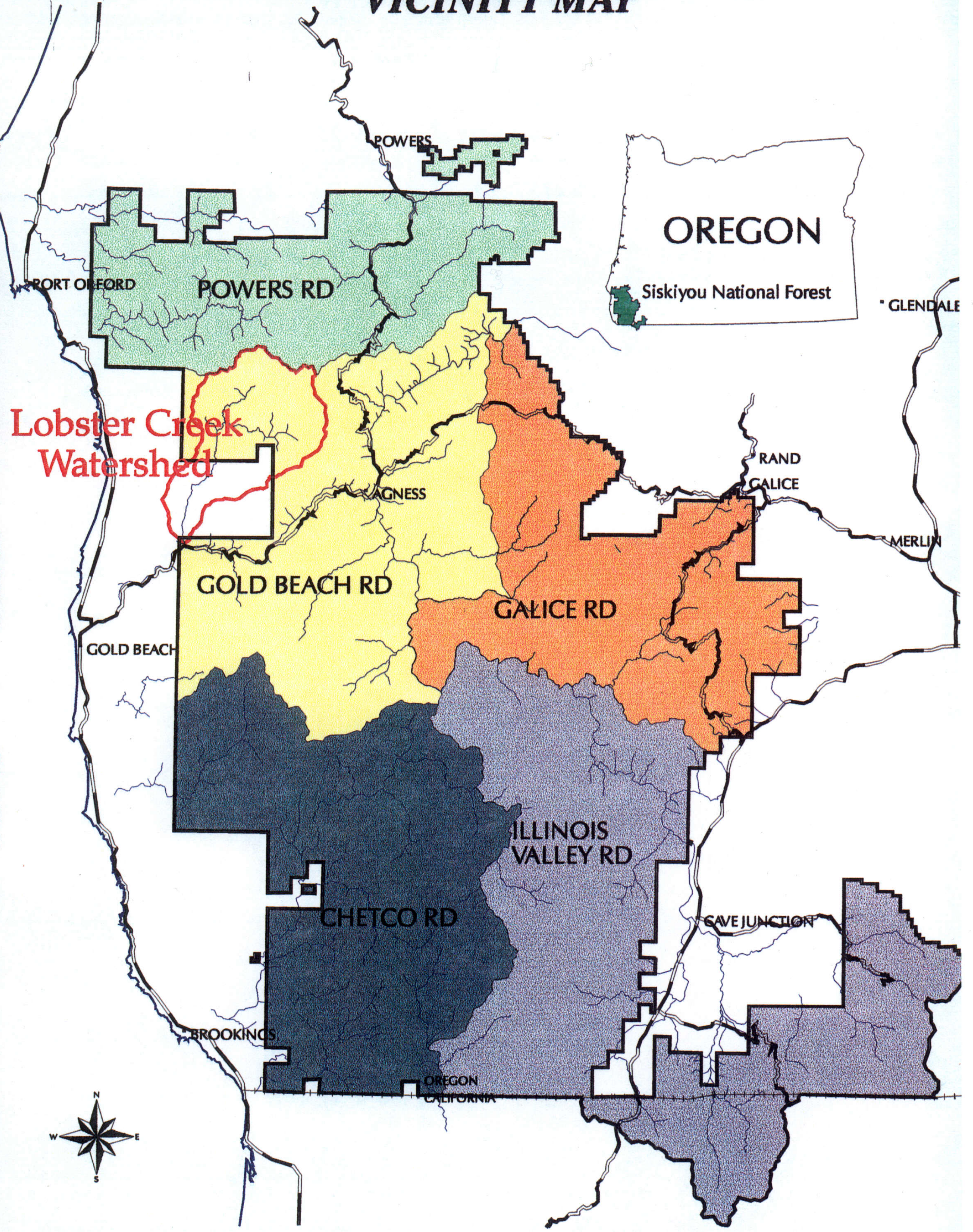
Road Number	Segment Length (Miles)	Transportation Network Analysis (TNA) Class	Culvert Treatment Priority (from Inventory)*	POC Disease Recommended Treatment**
5502221	1.07	Secondary		
5502222	0.35	Candidate		
5502223	2.37	Candidate		Close 1.4 miles
5502224	0.18	Candidate		
5502225	0.67	Candidate		
5502226	0.90	Candidate		
5502227	0.44	Candidate		Close all
5502228	0.23	Candidate		
5502229	0.21	Candidate		Close all
5502230	0.89	Candidate		
5502250	0.26	Candidate		
5502260	3.46	Candidate	Medium	Close all
5502265	1.34	Candidate		Close all
5502266	0.09	Candidate		Closeall
5502268	0.17	Candidate		Close all
5502270	0.18	Candidate		
5502300	0.75	Candidate		Close all
5502317	0.03	Candidate		
5502320	2.04	Candidate	High	Close 1.0 miles
5502321	0.19	Candidate	High	
5502322	0.06	Candidate		Close all
5502323	0.11	Candidate		Close all

* Culvert inventory evaluated stream crossings only. The inventory found no stream crossing culverts on roads with a blank in this column. See culvert inventory for road mile post of culvert and evaluation of culvert condition.

** See Tables 17, 18, and 19 and associated text for more detail on road treatments to prevent spread of Port-Orford-cedar root disease.

APPENDIX B

LOBSTER CREEK WATERSHED VICINITY MAP



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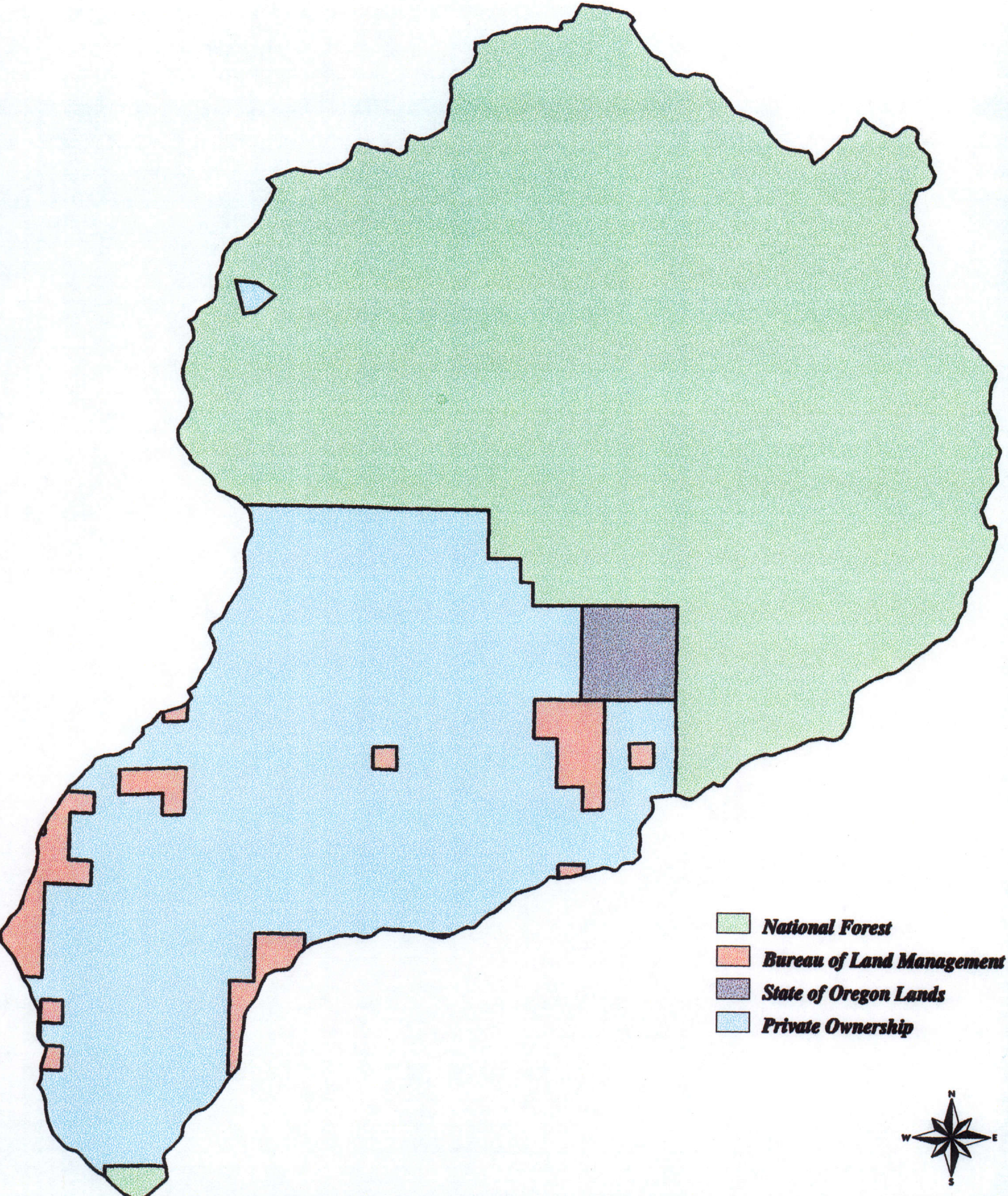
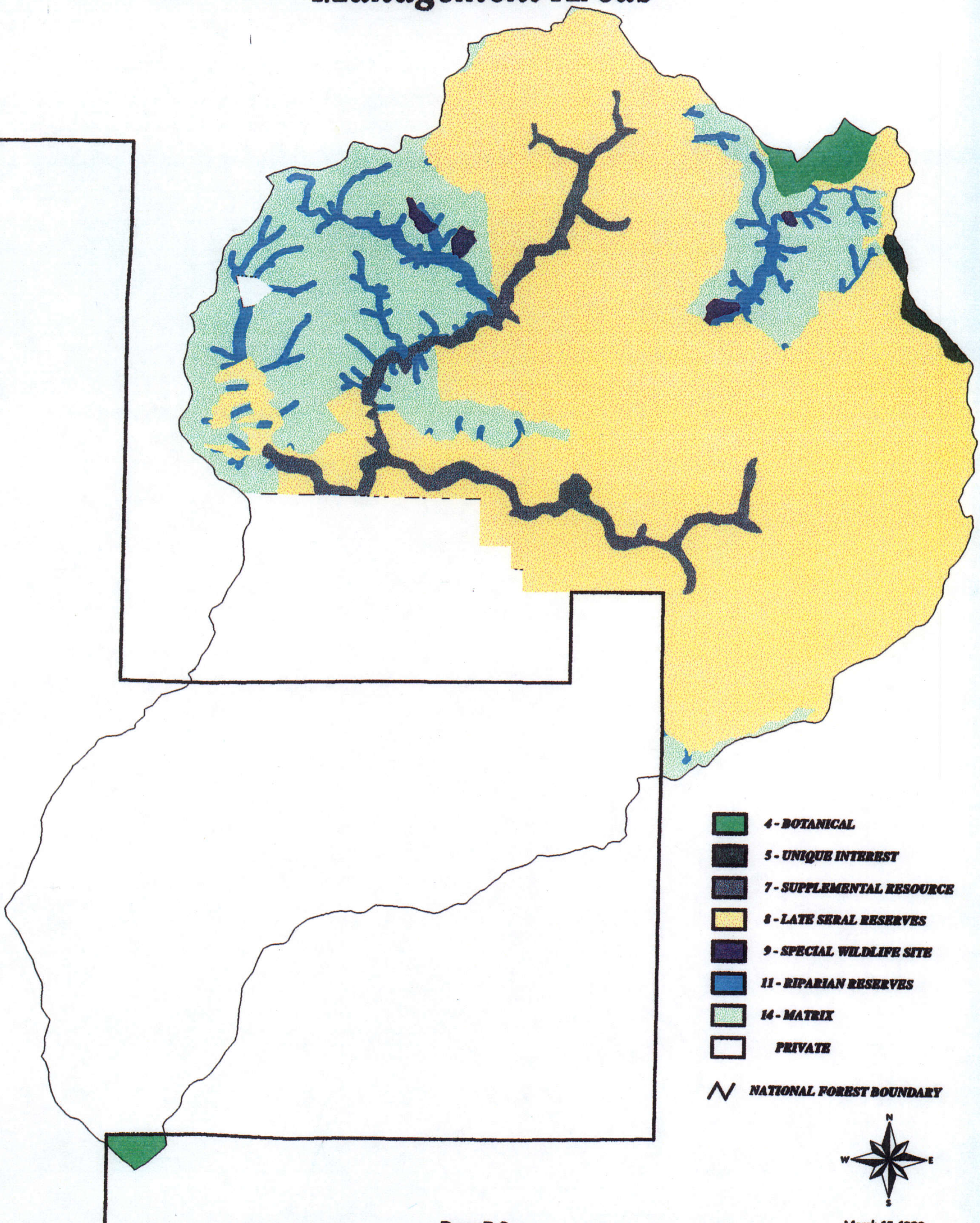
LOBSTER CREEK WATERSHED
Ownership



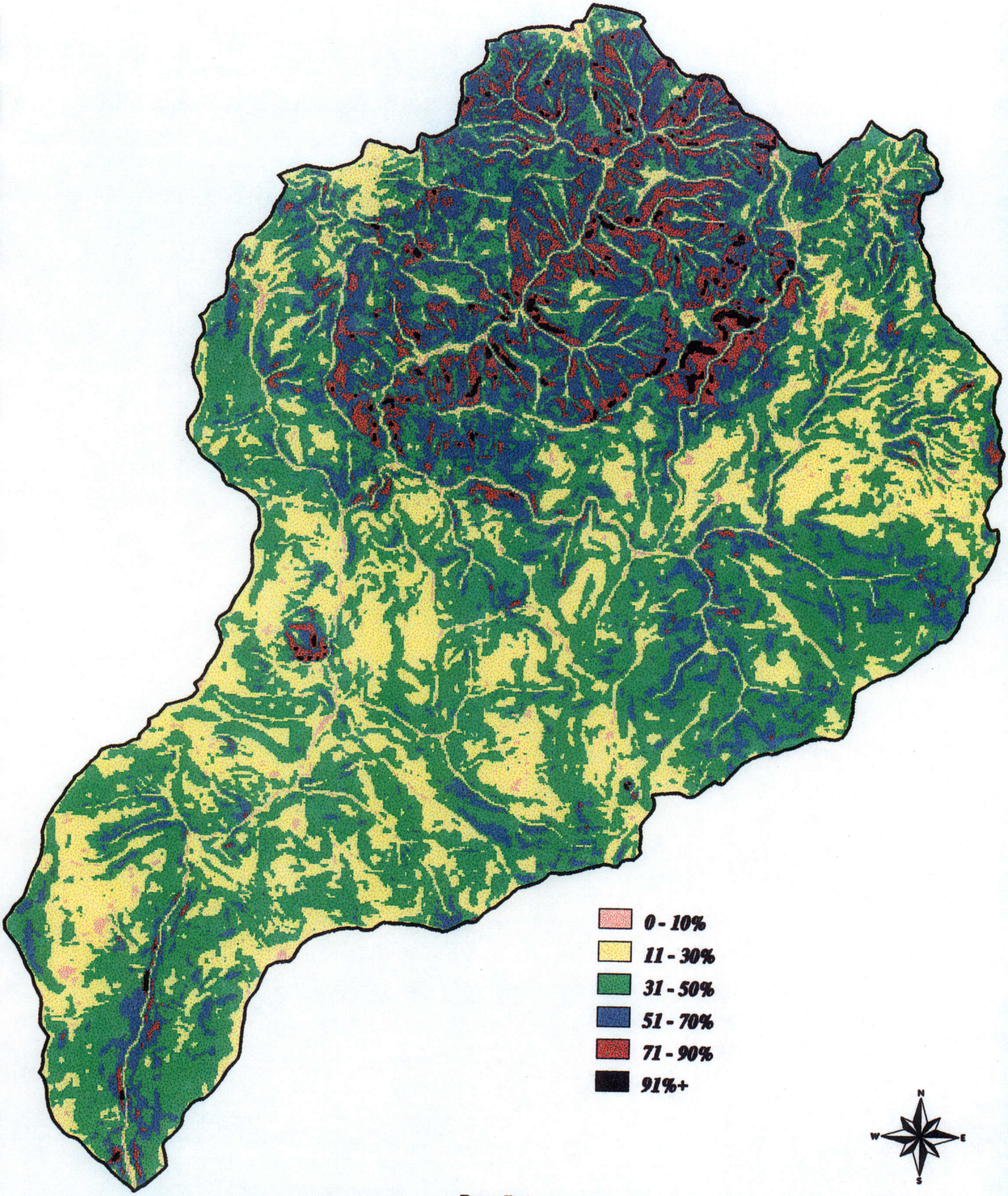
March 15, 1999

LOBSTER CREEK WATERSHED
Management Areas

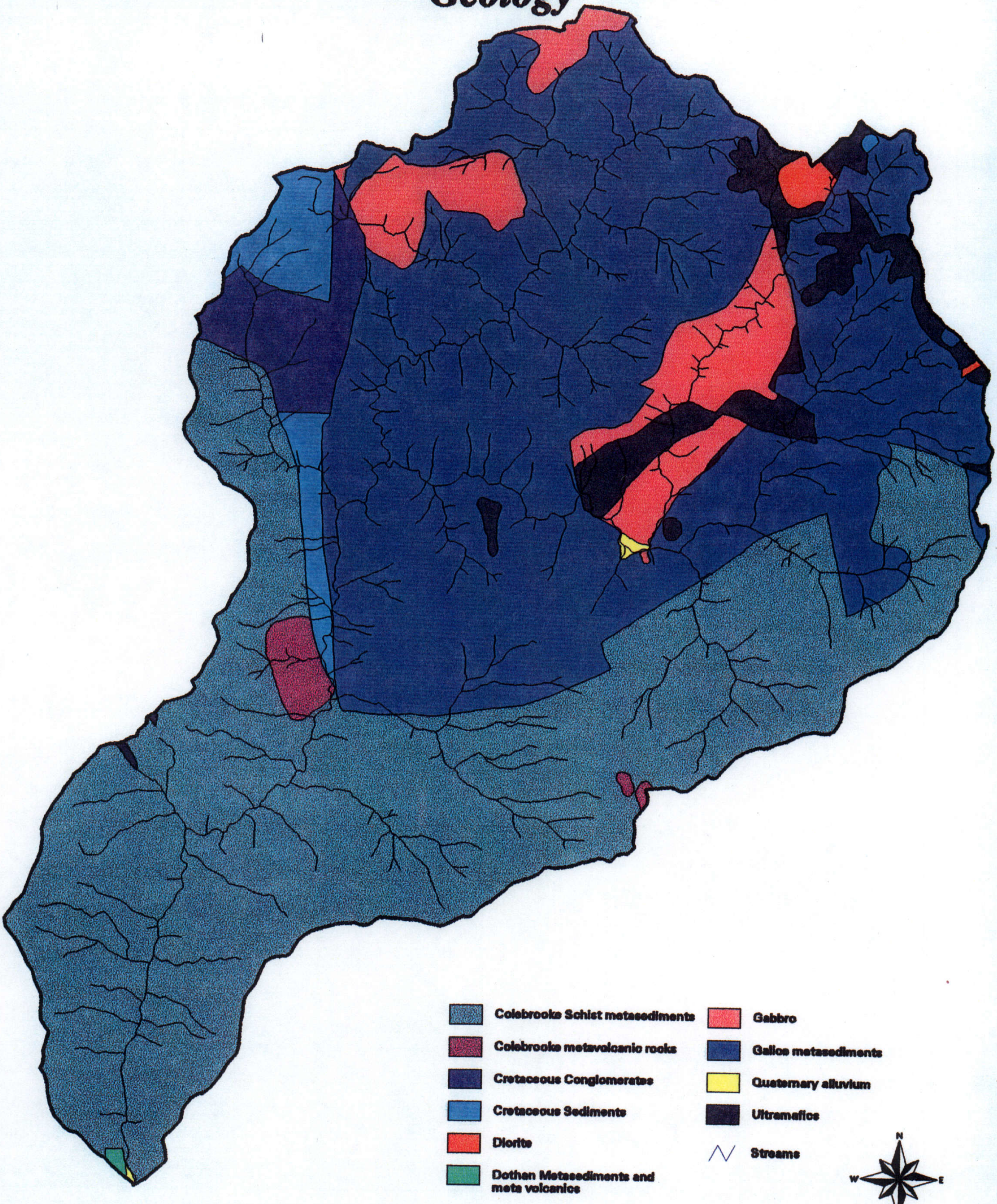


March 15, 1999

LOBSTER CREEK WATERSHED
Slope Classes



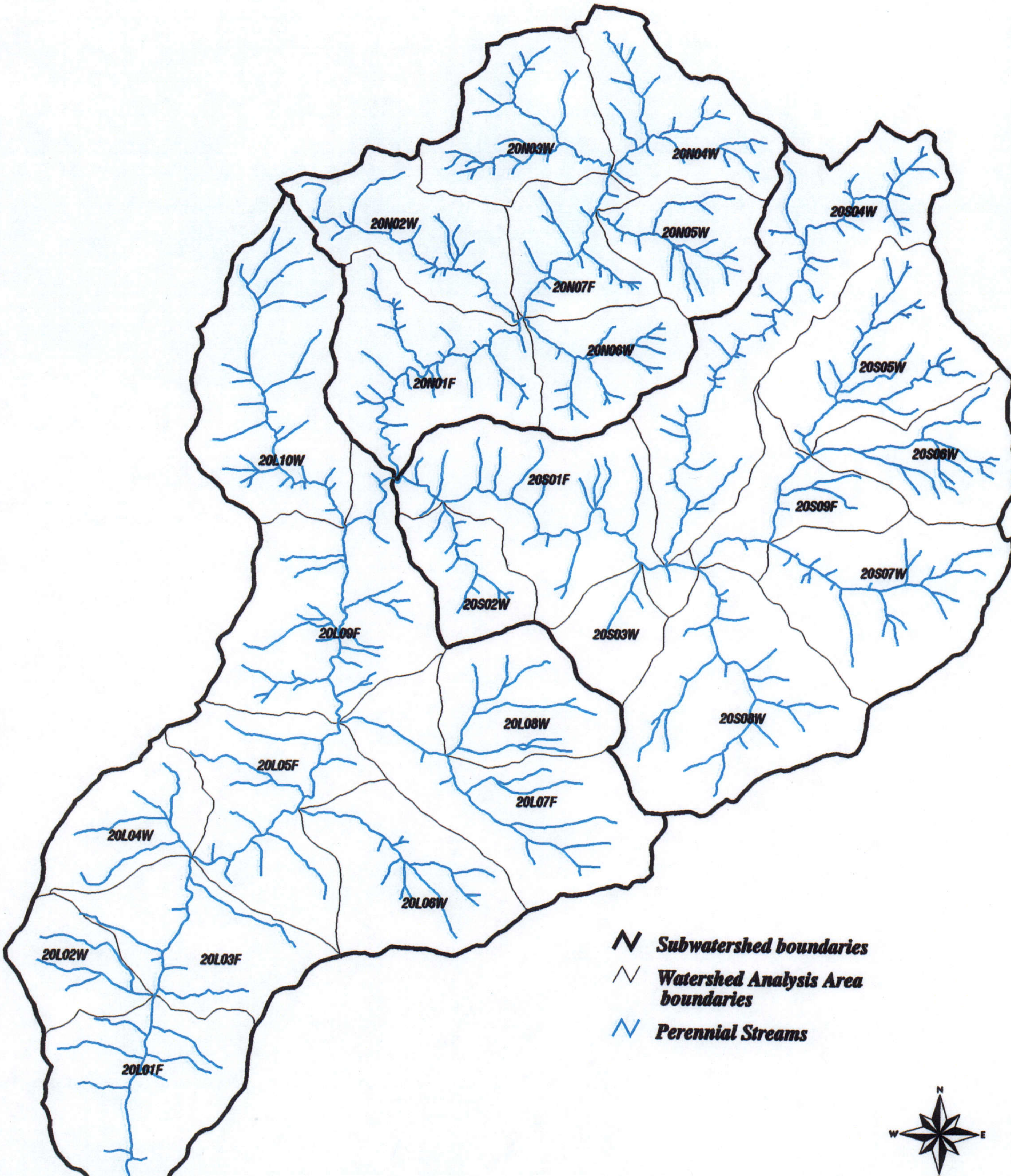
LOBSTER CREEK WATERSHED
Geology



March 15, 1999

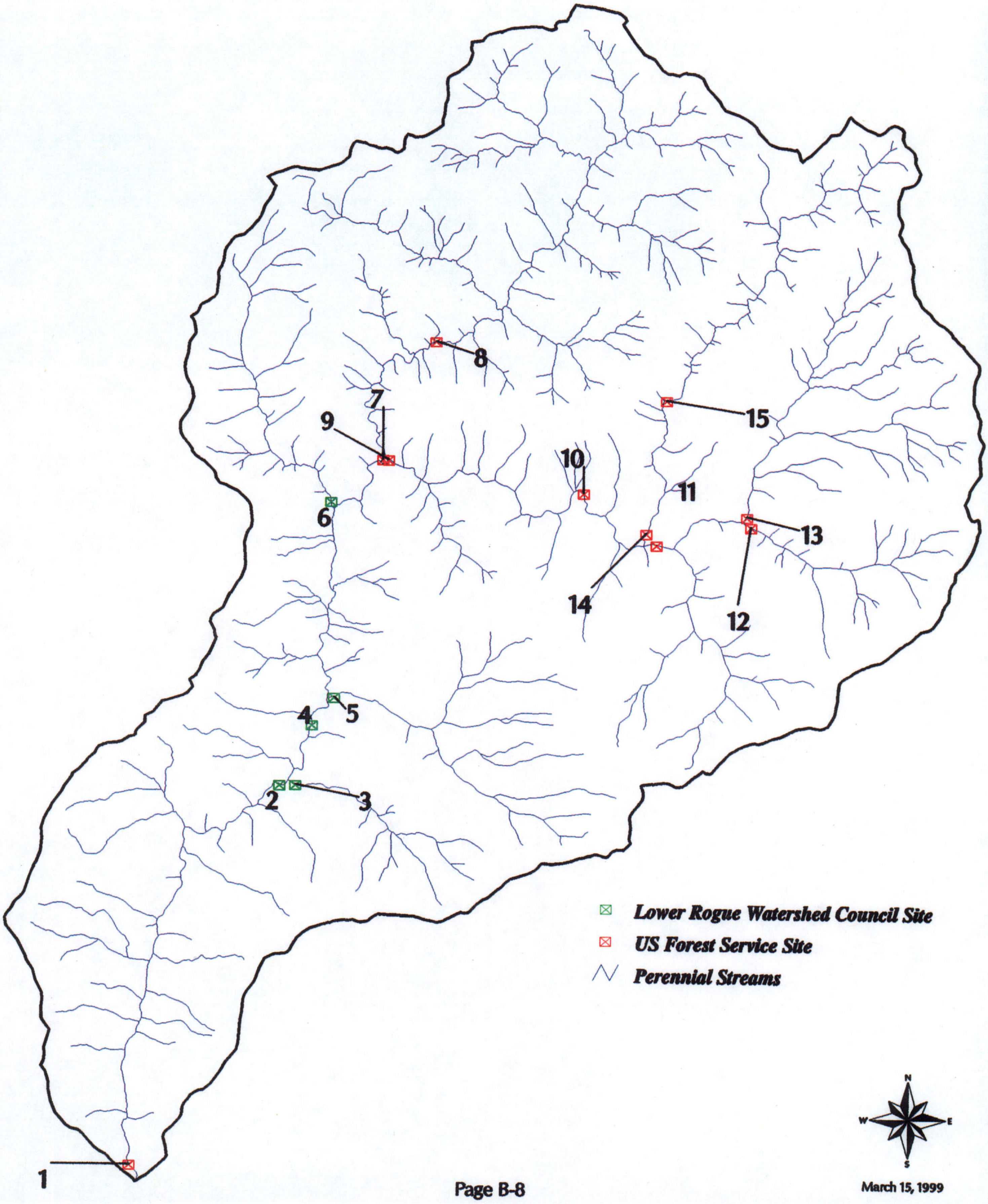
LOBSTER WATERSHED
Elevation Zones

LOBSTER CREEK WATERSHED
Streams and Watershed Analysis Areas



March 15, 1999

LOBSTER CREEK WATERSHED
Temperature Monitoring Sites



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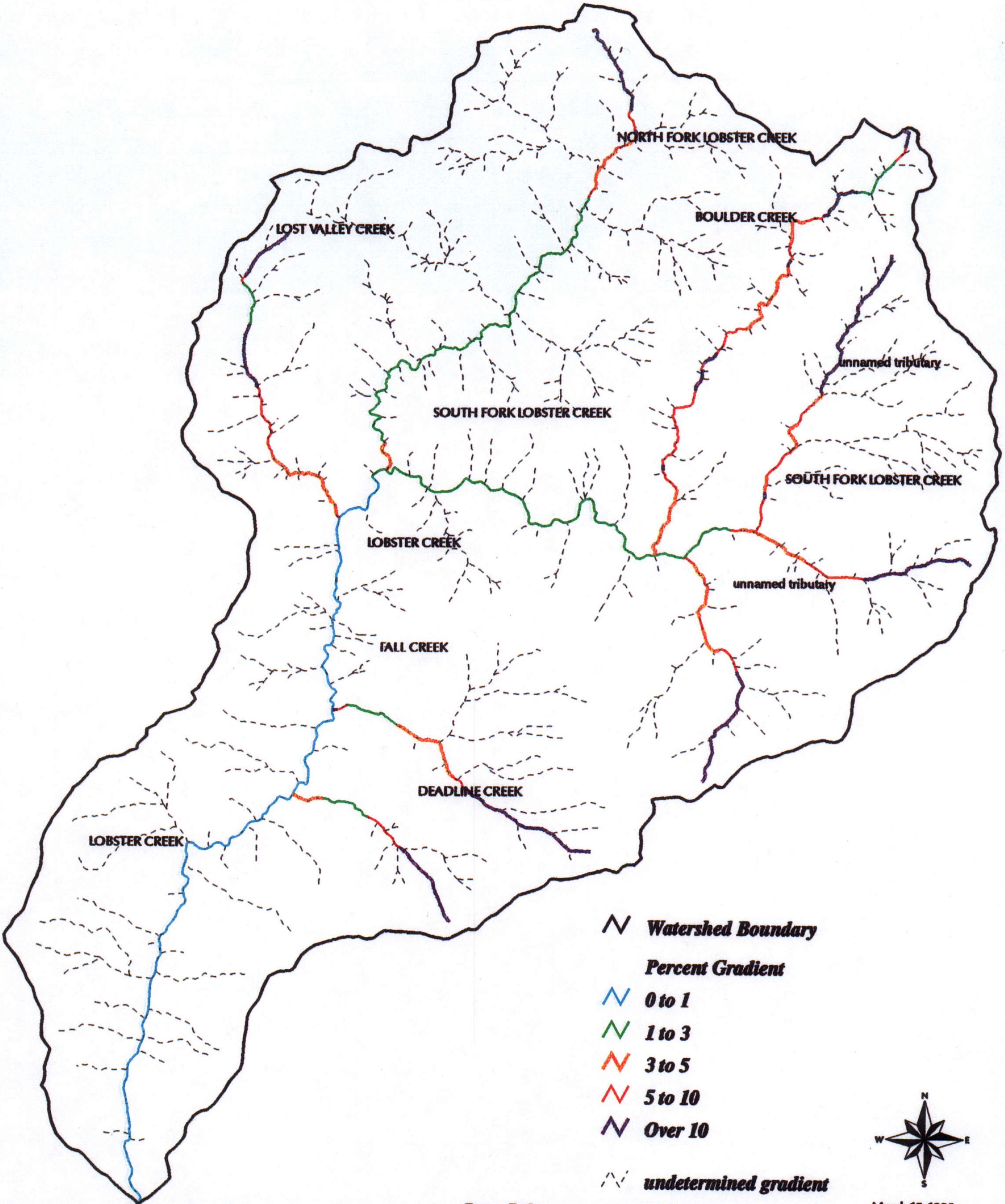
LOBSTER CREEK WATERSHED
Stream Gradient Classes



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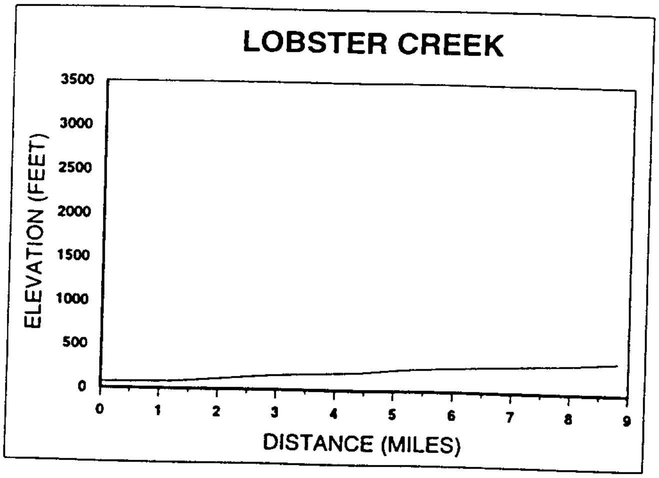
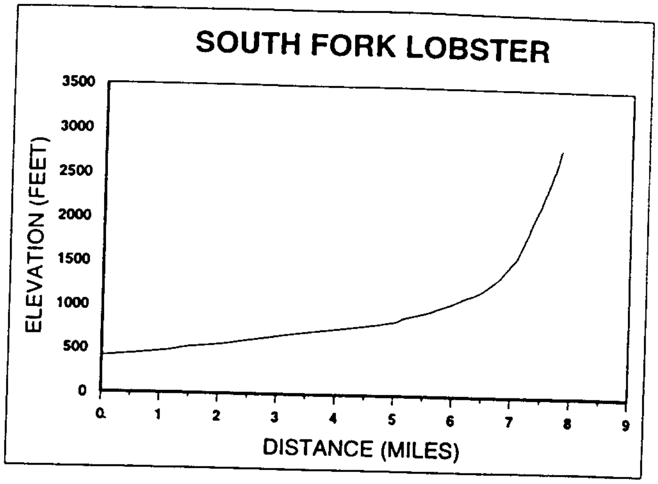
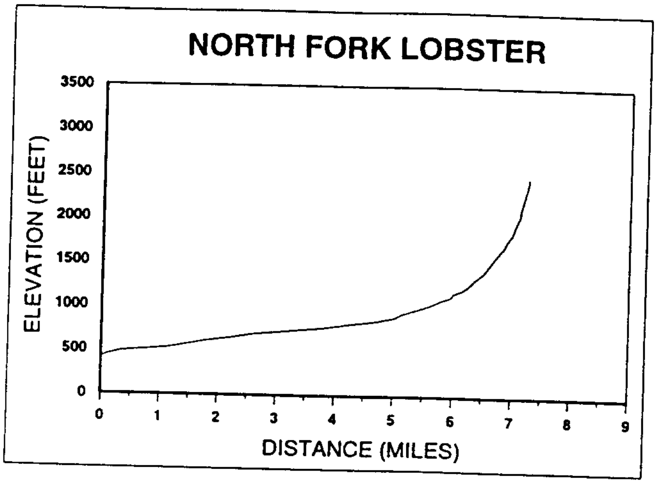
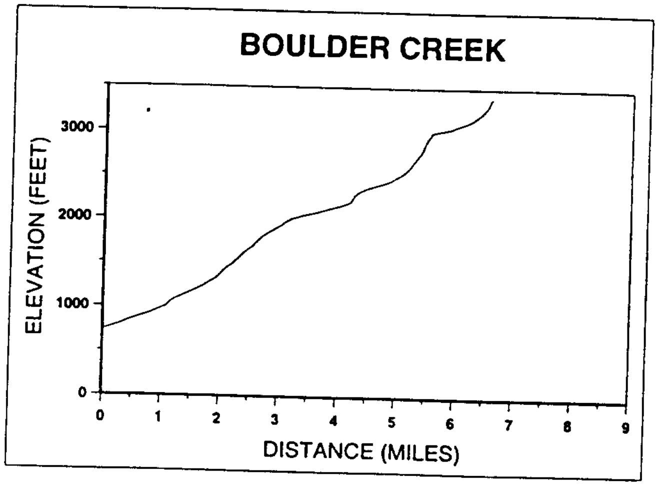
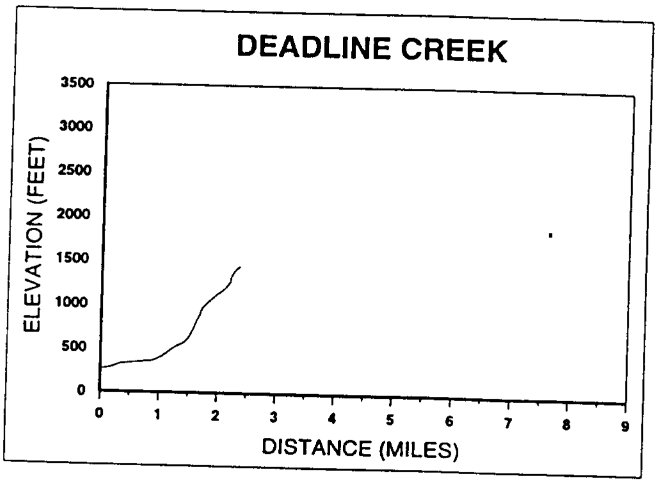
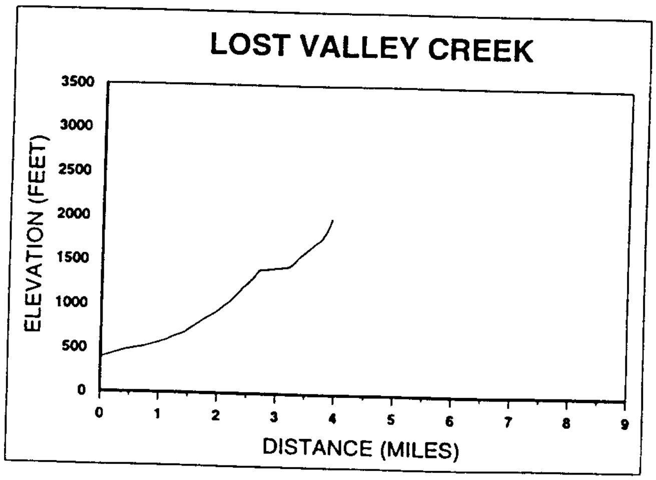

LOBSTER CREEK
ELEVATION (FEET)
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)


SOUTH FORK LOBSTER
ELEVATION (FEET)
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)

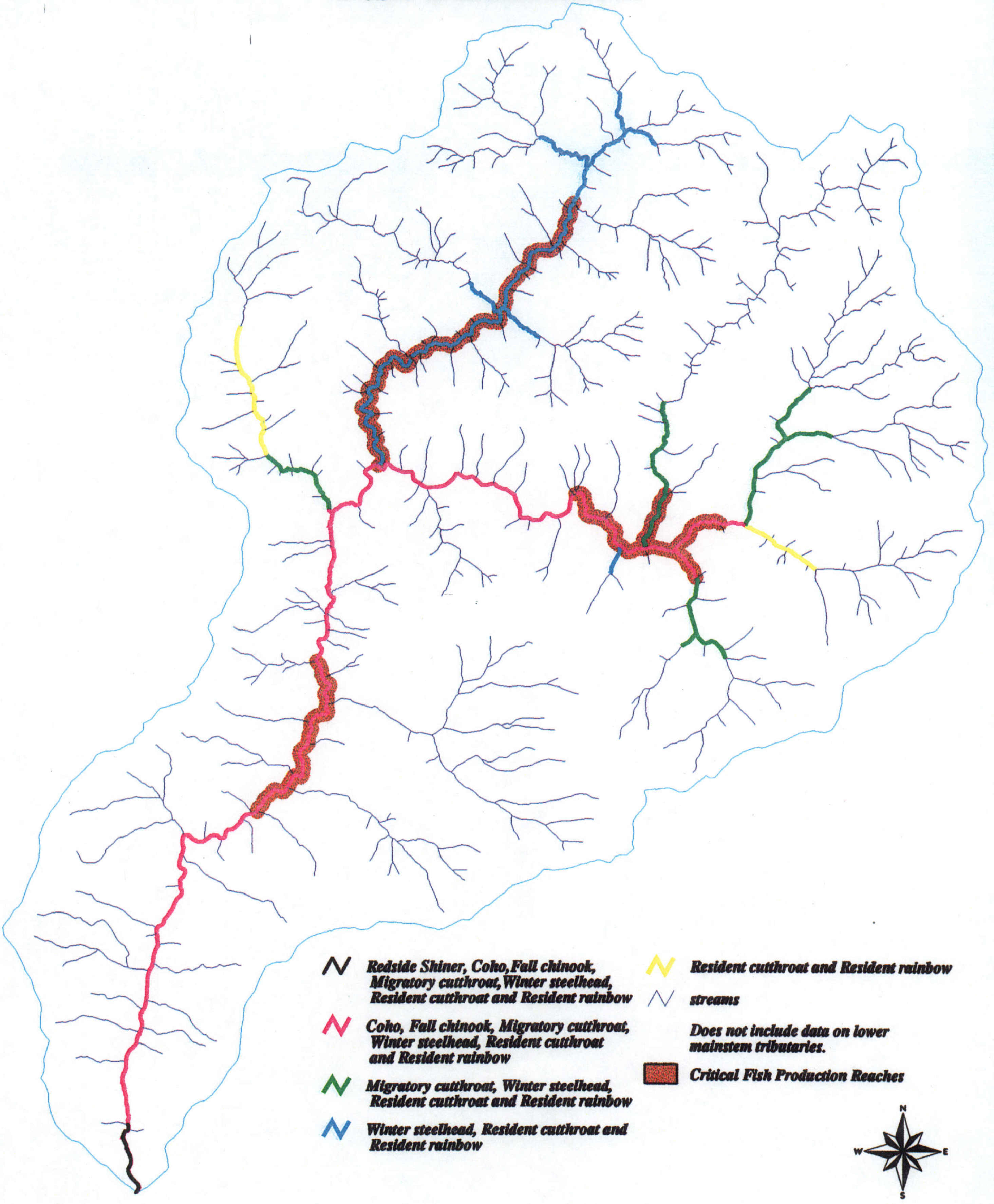

NORTH FORK LOBSTER
ELEVATION (FEET)
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)


BOULDER CREEK
ELEVATION (FEET)
3000
2000
1000
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)

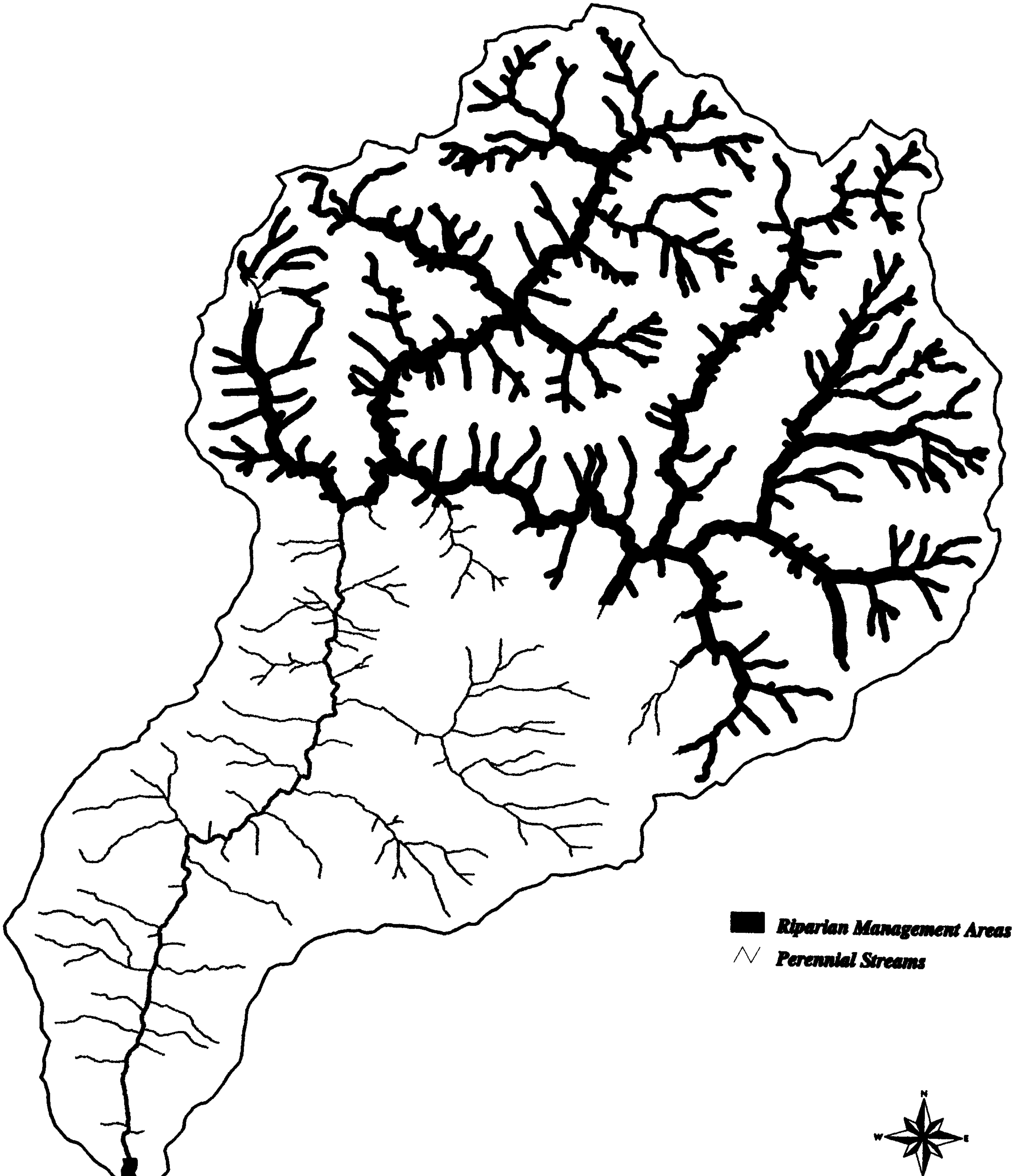

DEADLINE CREEK
ELEVATION (FEET)
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)


LOST VALLEY CREEK
ELEVATION (FEET)
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9
DISTANCE (MILES)

LOBSTER CREEK WATERSHED
Fish Distribution



LOBSTER CREEK WATERSHED
Riparian Management Areas



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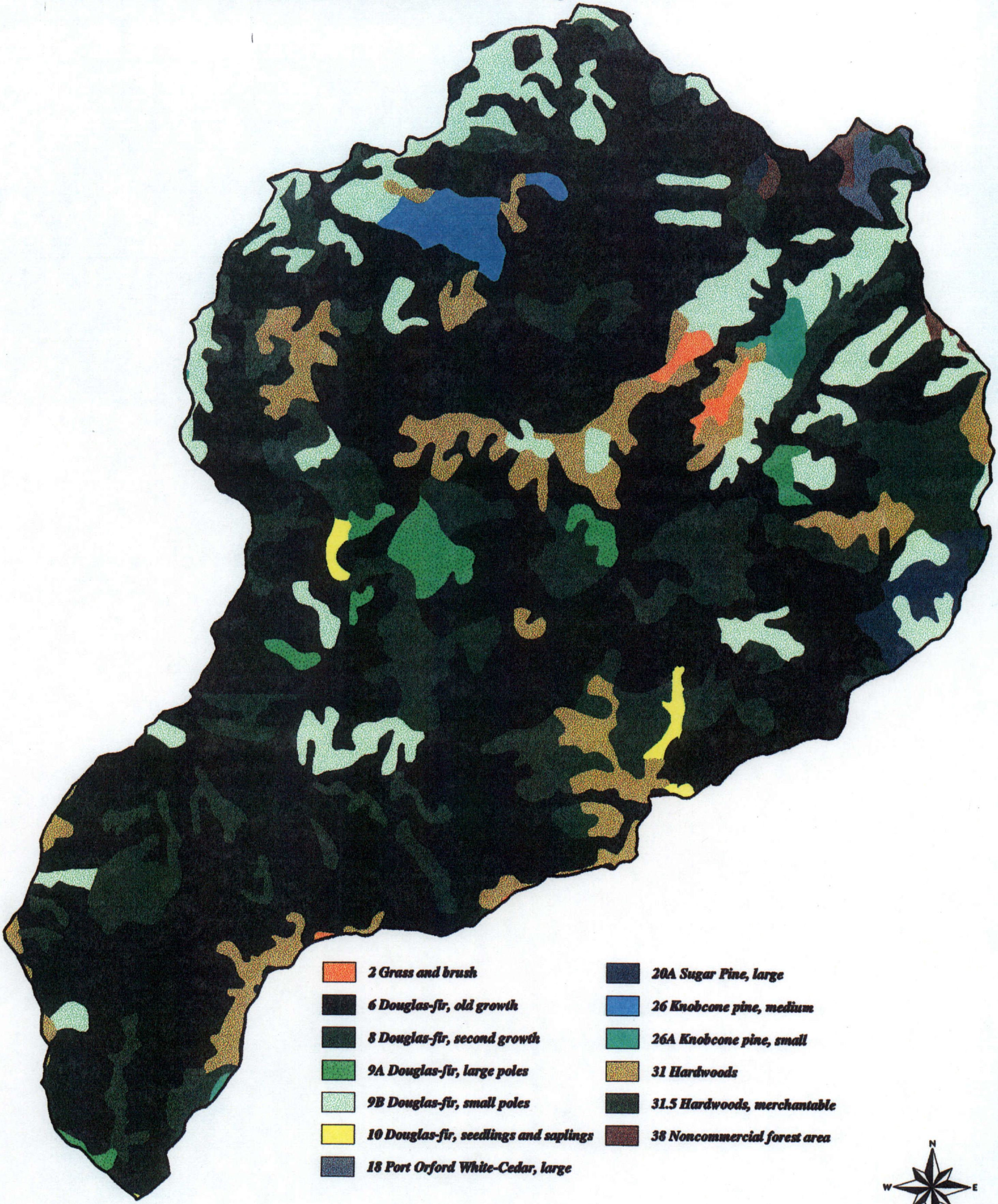
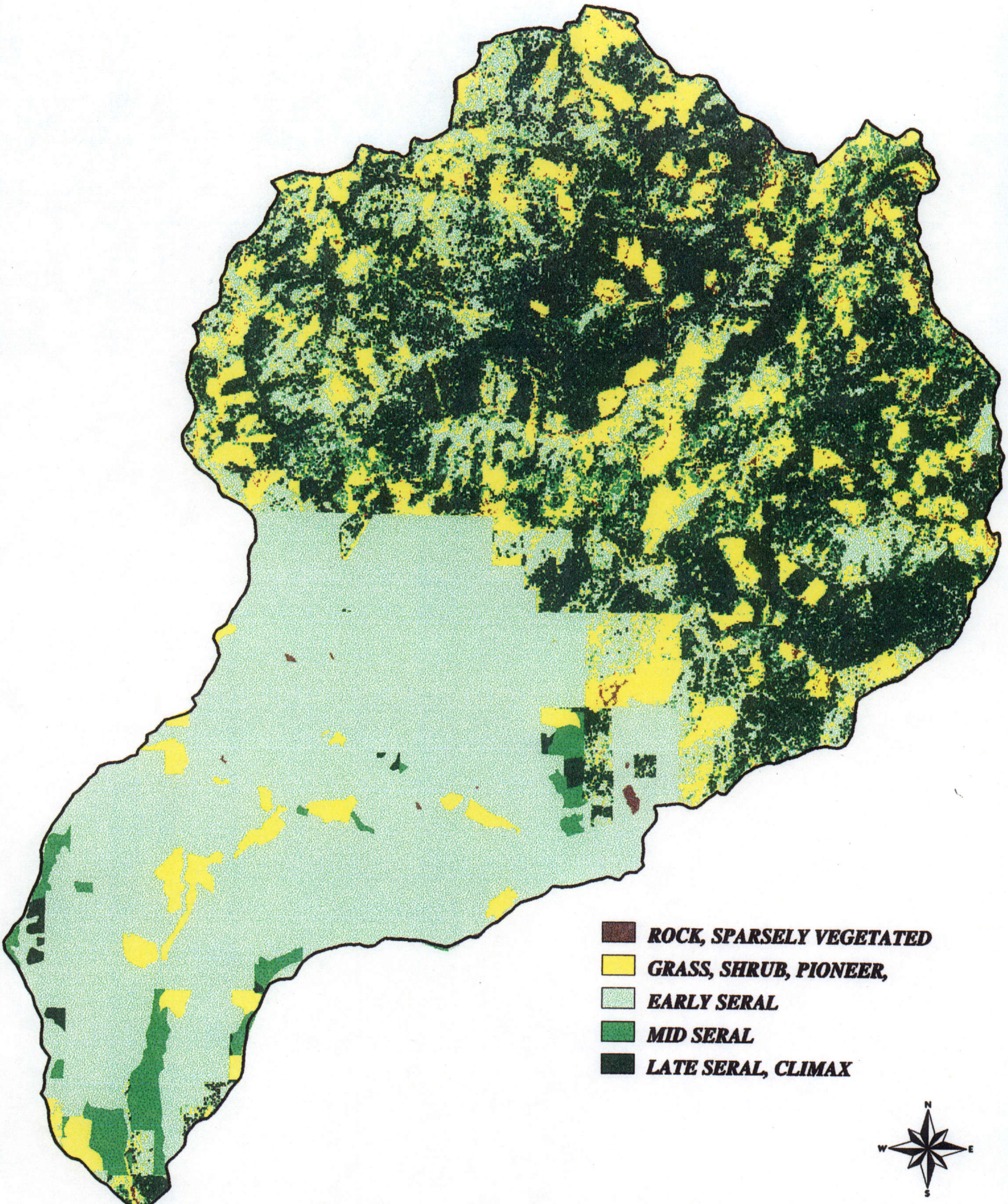
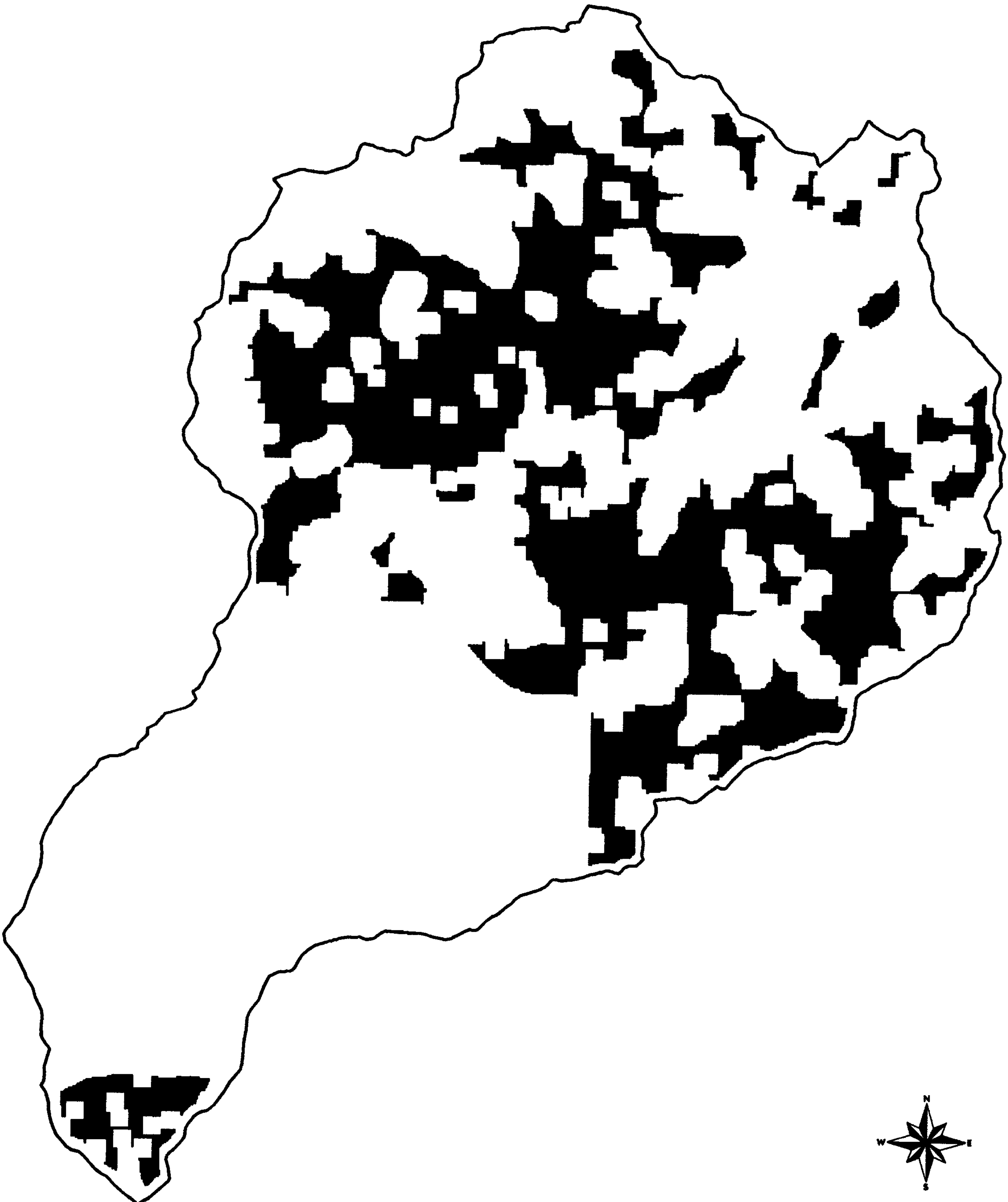
LOBSTER CREEK WATERSHED
1940 Historical Vegetation



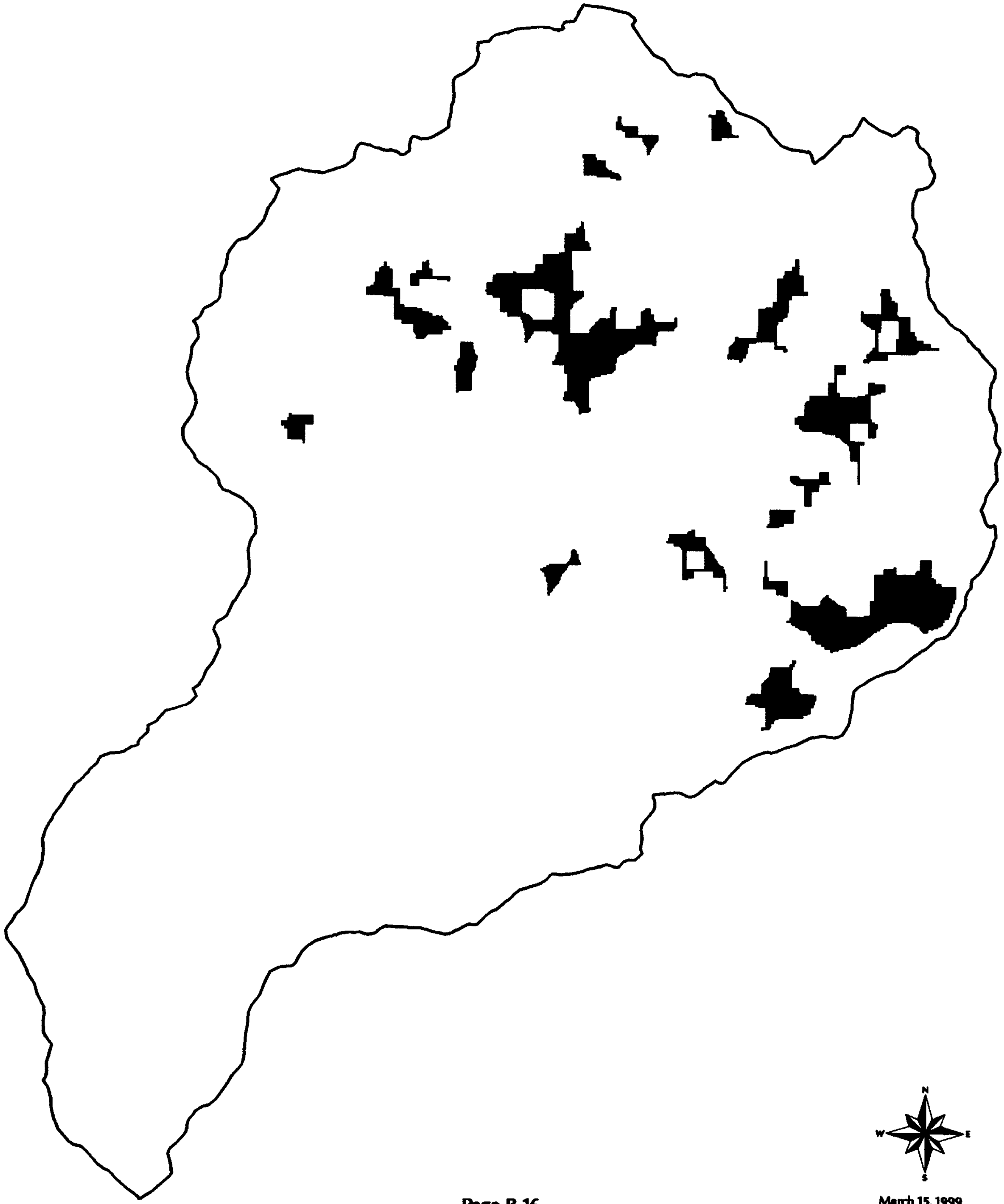
LOBSTER CREEK WATERSHED
Seral Stages



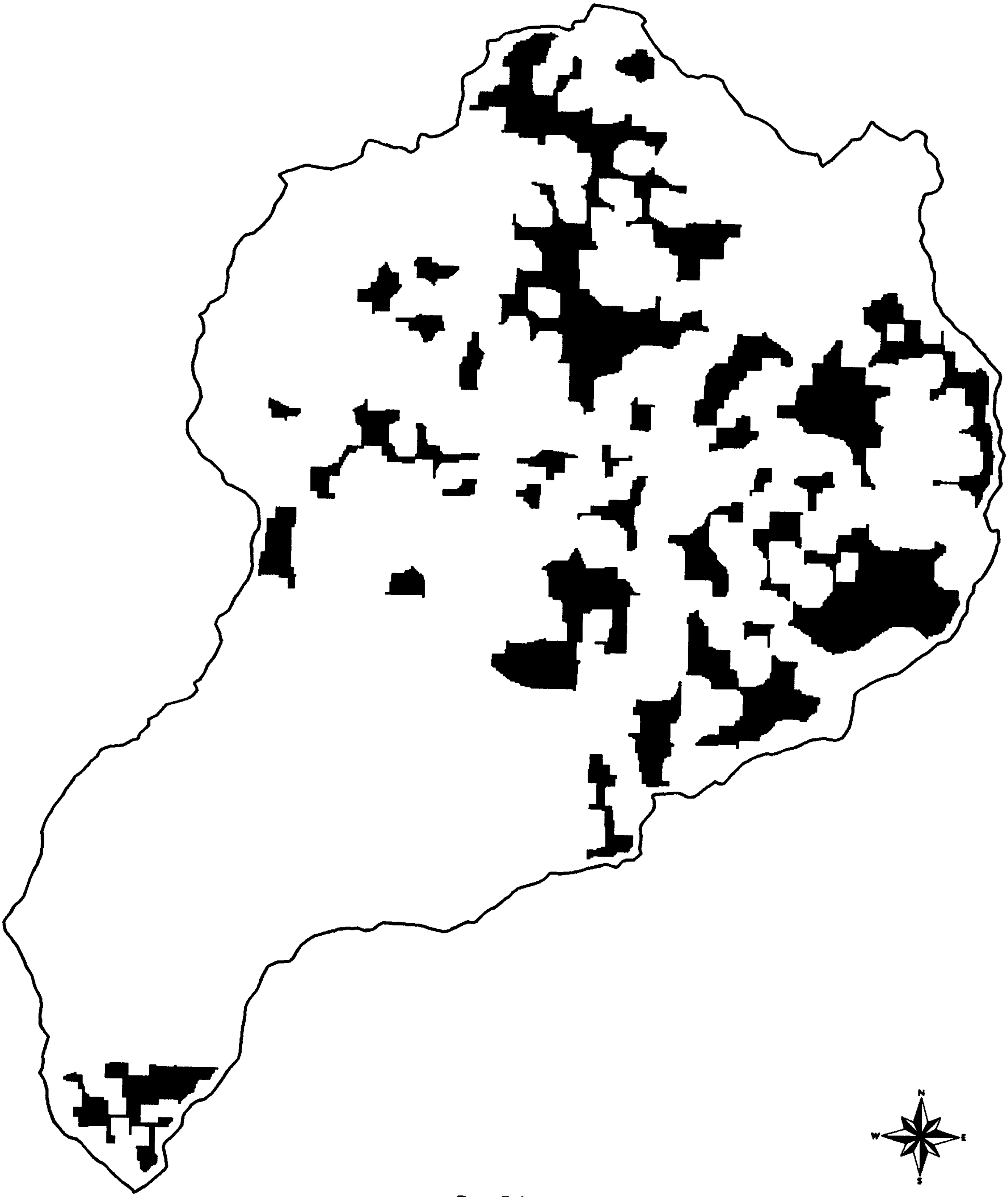
LOBSTER CREEK WATERSHED
1940 Interior Late-Seral Habitat



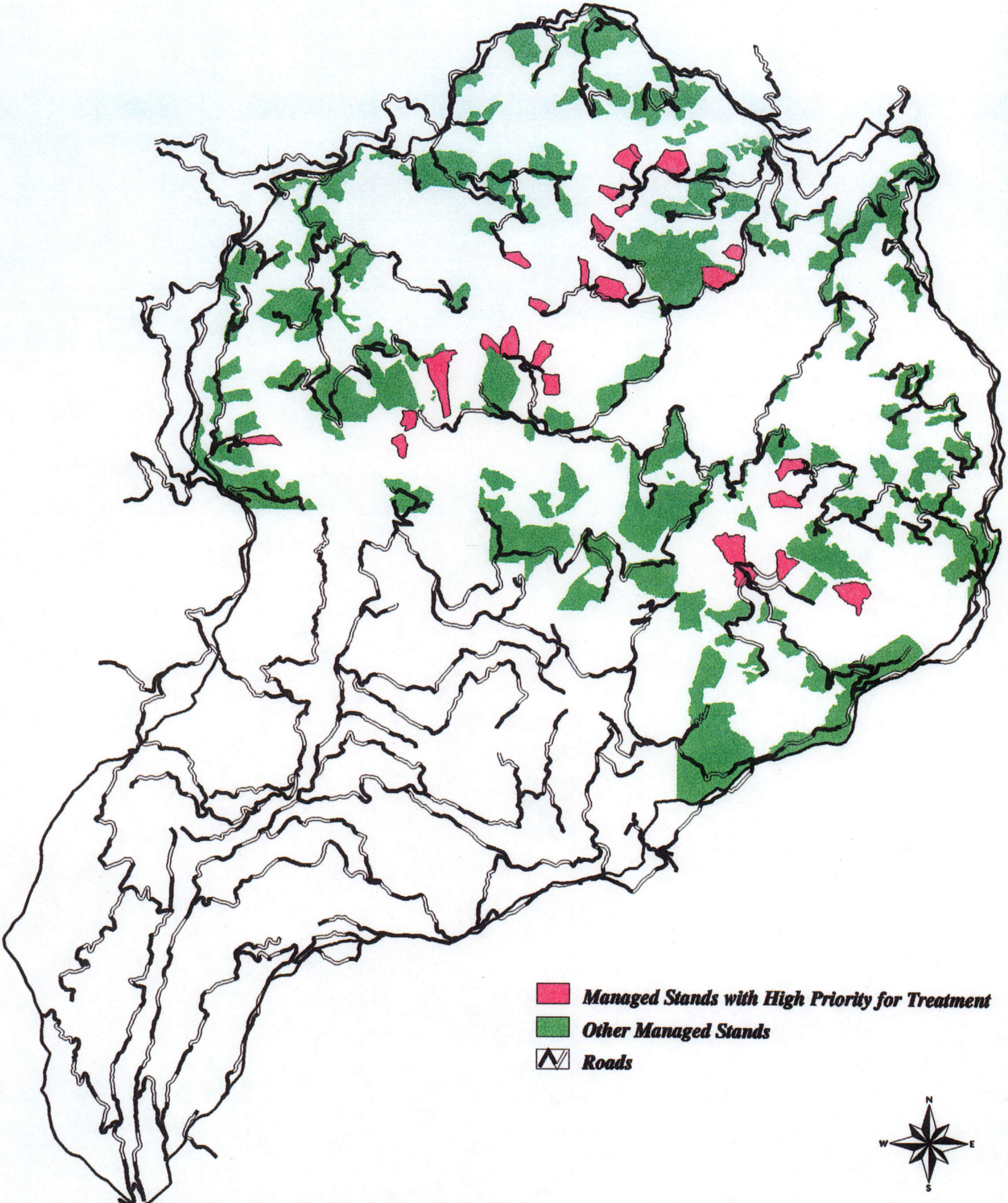
LOBSTER CREEK WATERSHED
1995 Interior Late-Seral Habitat



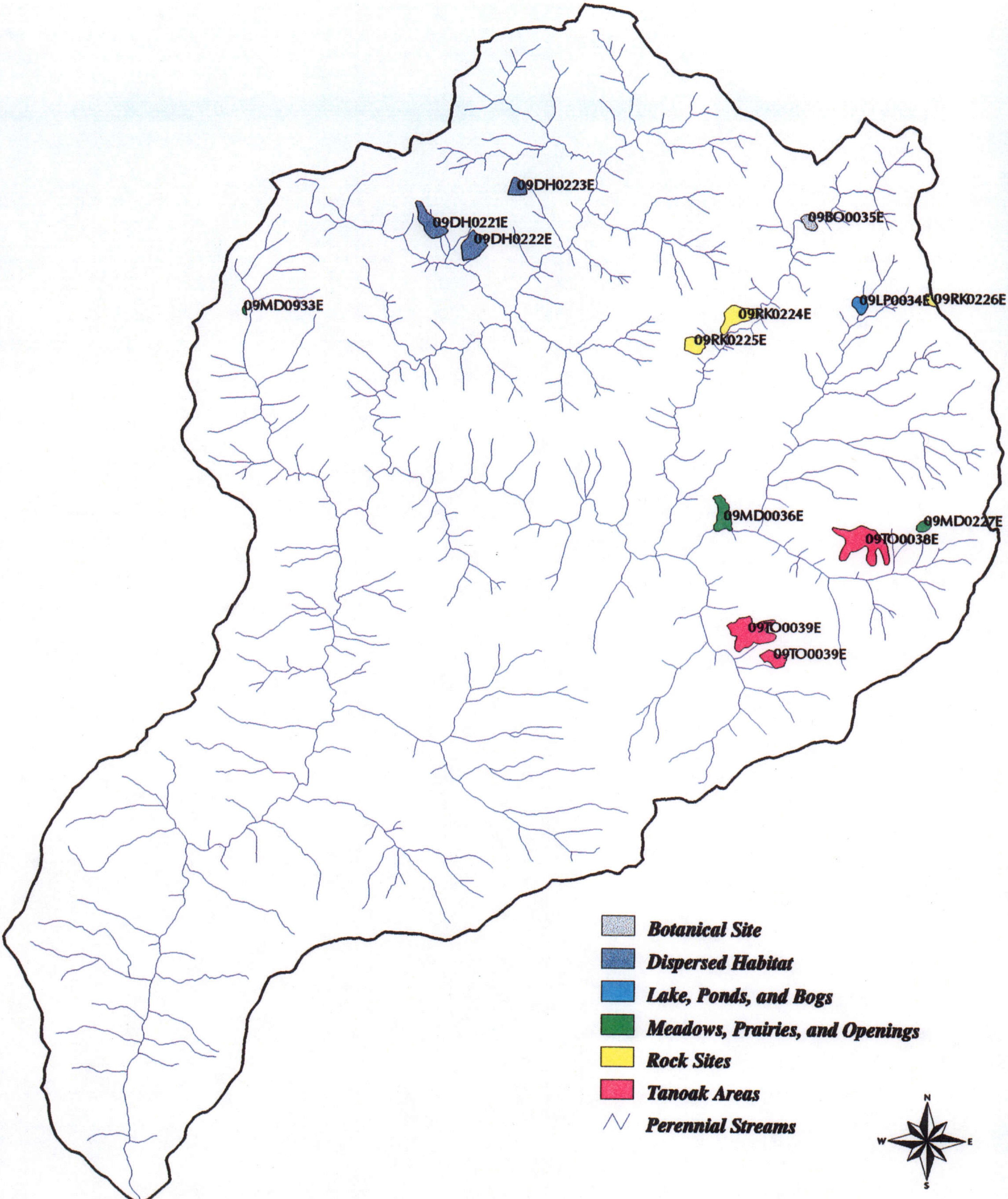
LOBSTER CREEK WATERSHED
2040 Interior Late-Seral Habitat



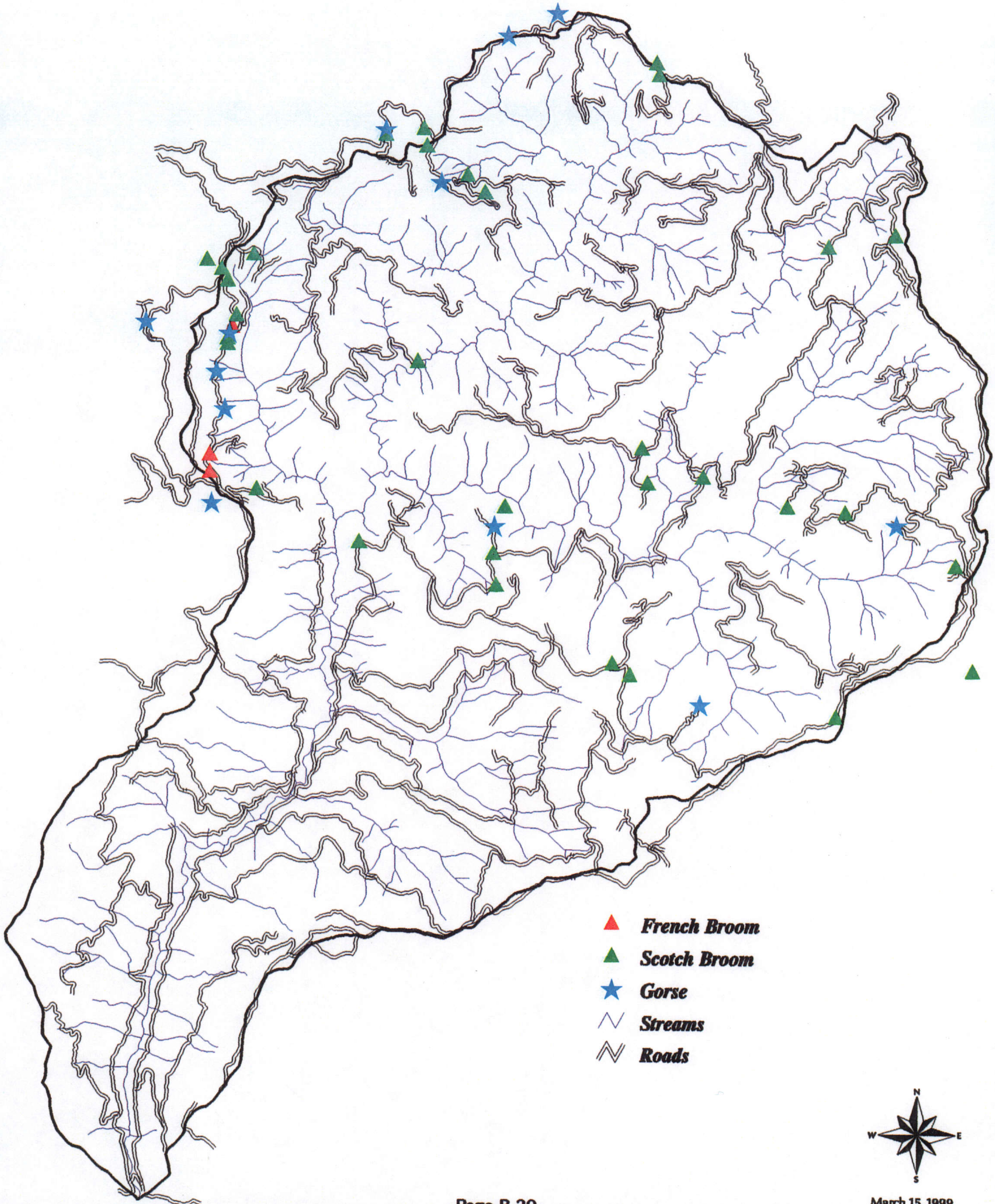
LOBSTER CREEK WATERSHED
Treatment Priority for Late Seral Development



LOBSTER CREEK WATERSHED
Special Wildlife Site Areas



LOBSTER CREEK WATERSHED
Noxious Weeds Sites



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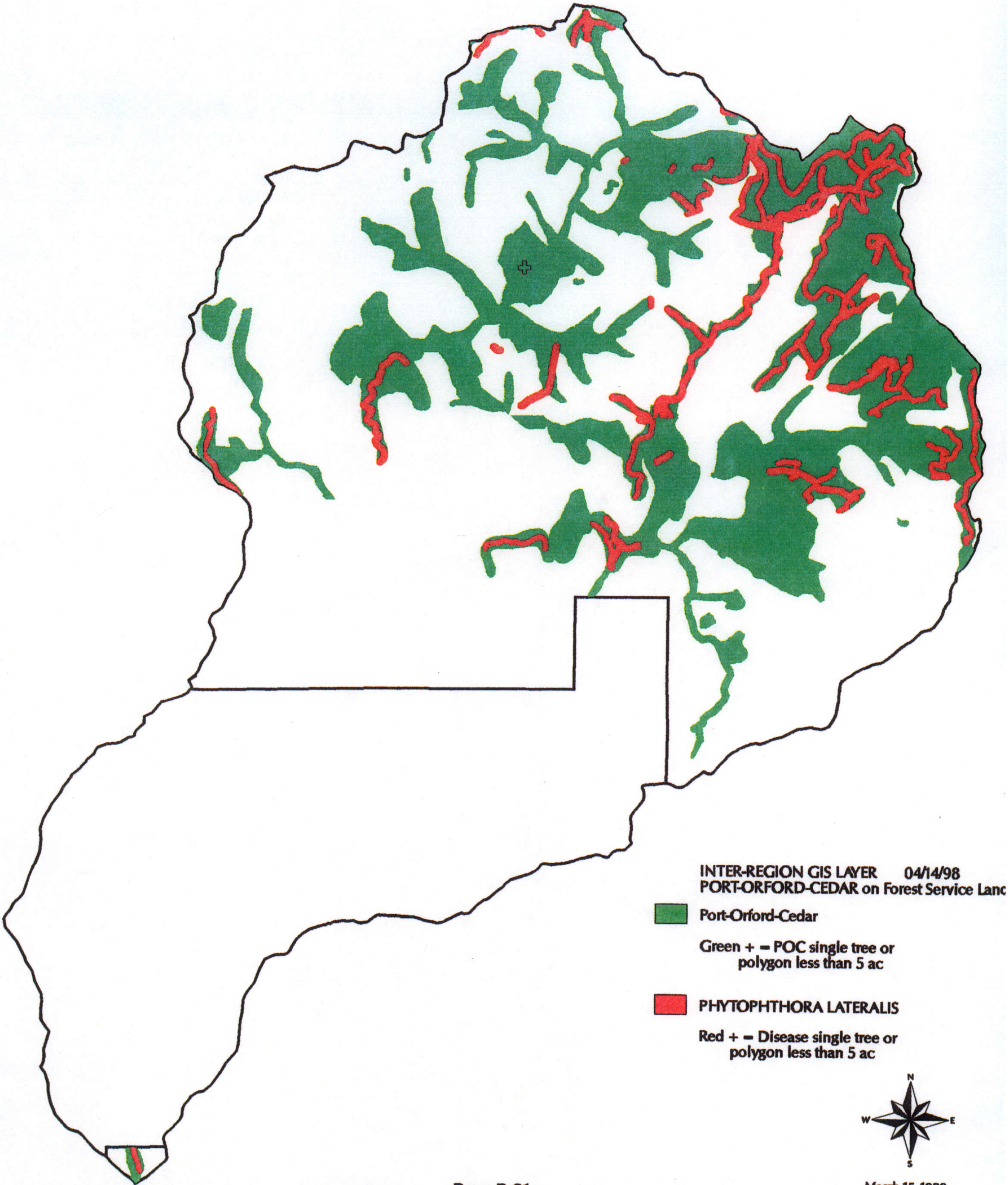
LOBSTER CREEK WATERSHED
Port Orford Cedar



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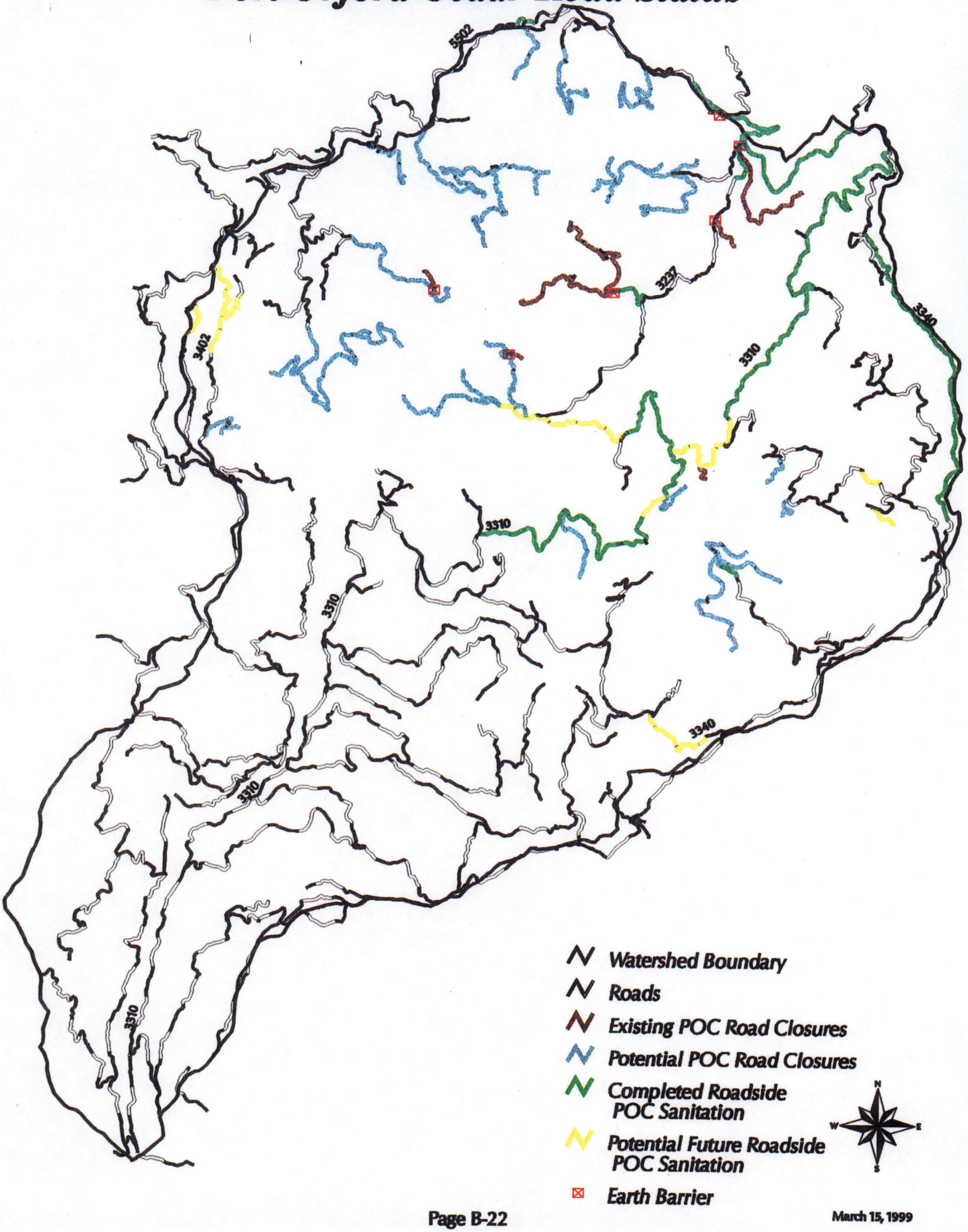
LOBSTER CREEK WATERSHED
Port Orford Cedar Road Status



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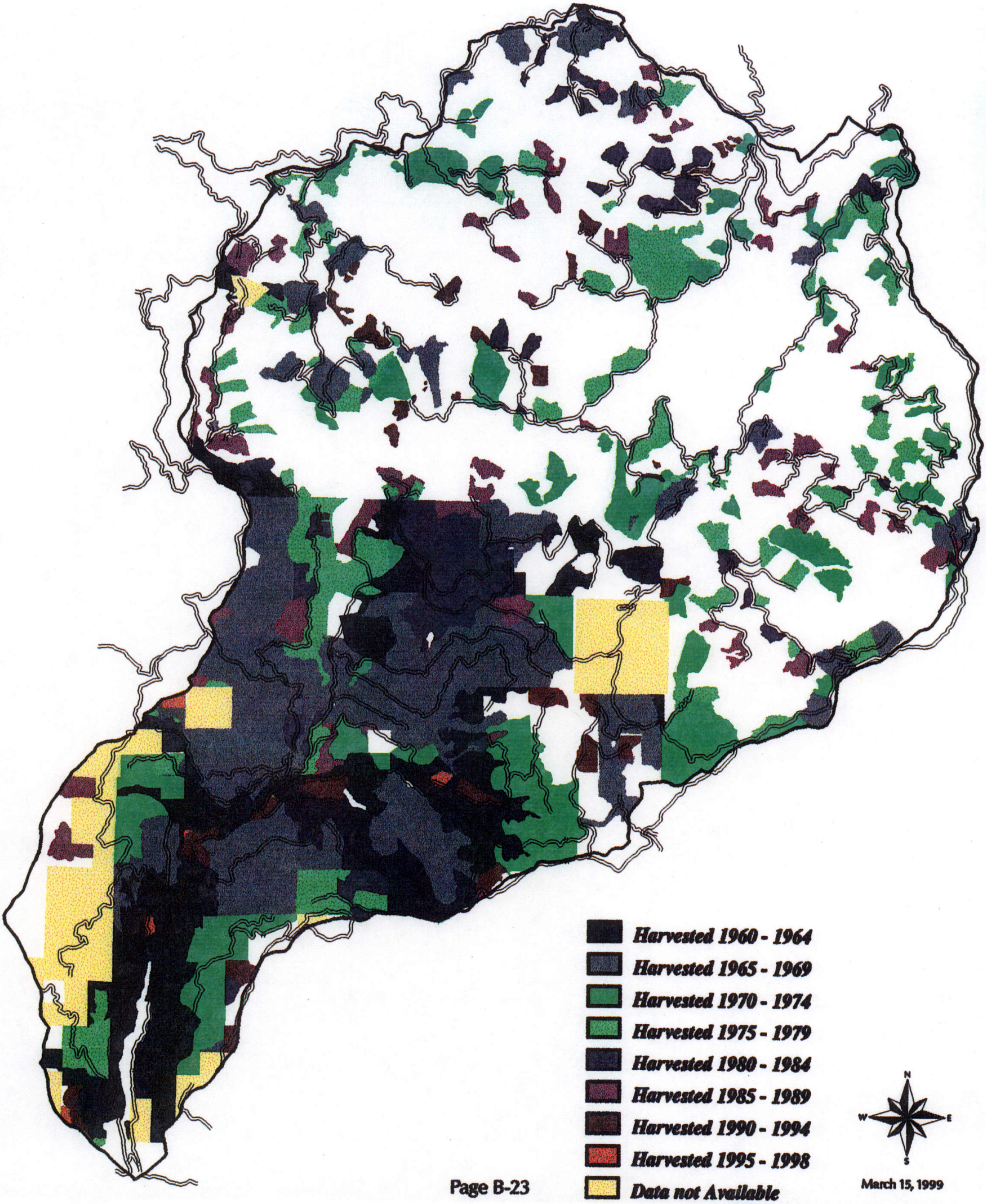
LOBSTER CREEK WATERSHED
Managed Stands and Roads



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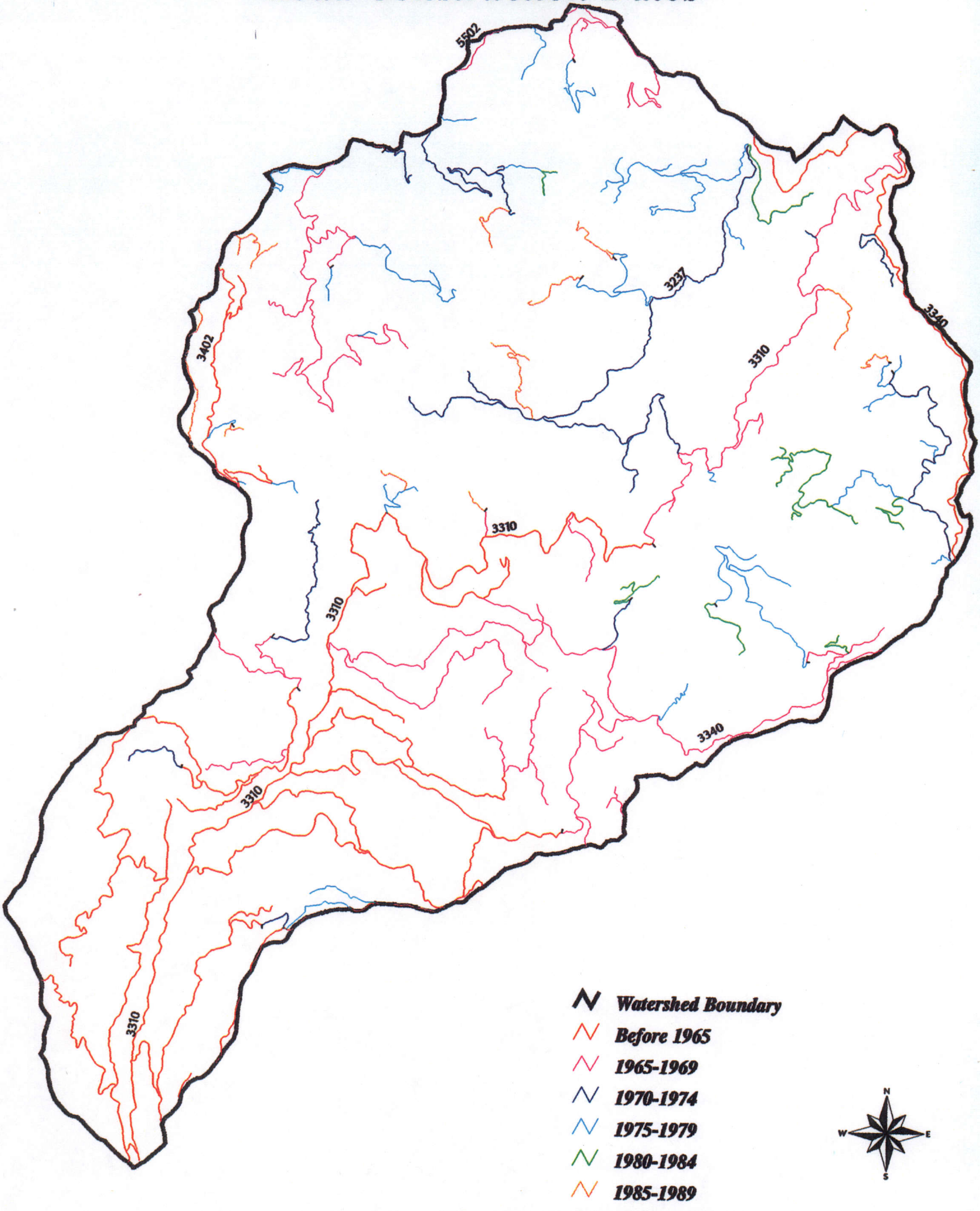
LOBSTER CREEK WATERSHED
Road Construction Dates



March 15, 1999